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DEVELOPMENT DIGEST

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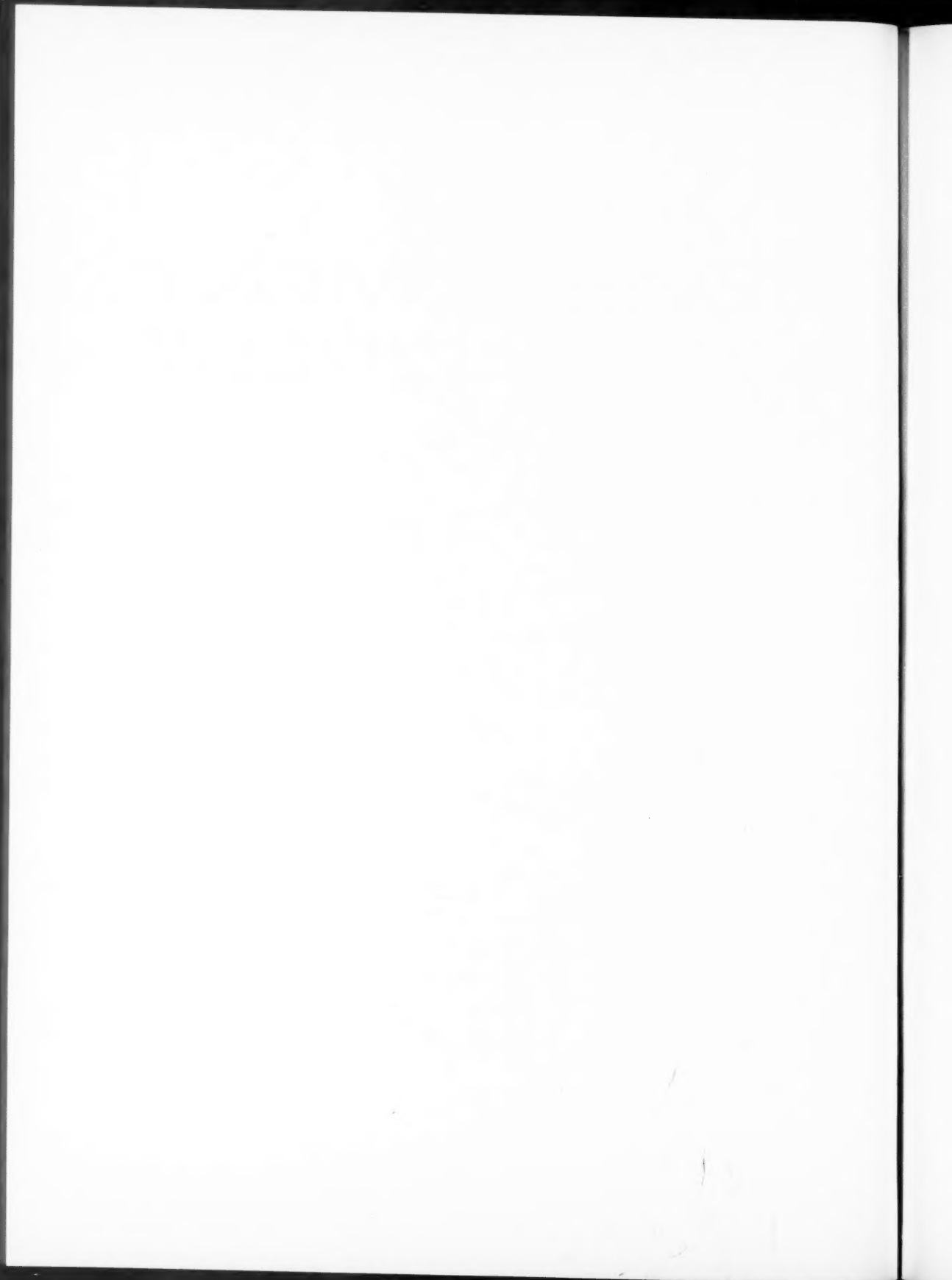
DEVELOPMENT DIGEST

A quarterly journal of excerpts, summaries, and reprints
of current materials on economic and social development

Gordon Donald, Editor; Pushpa Nand Schwartz, Associate Editor
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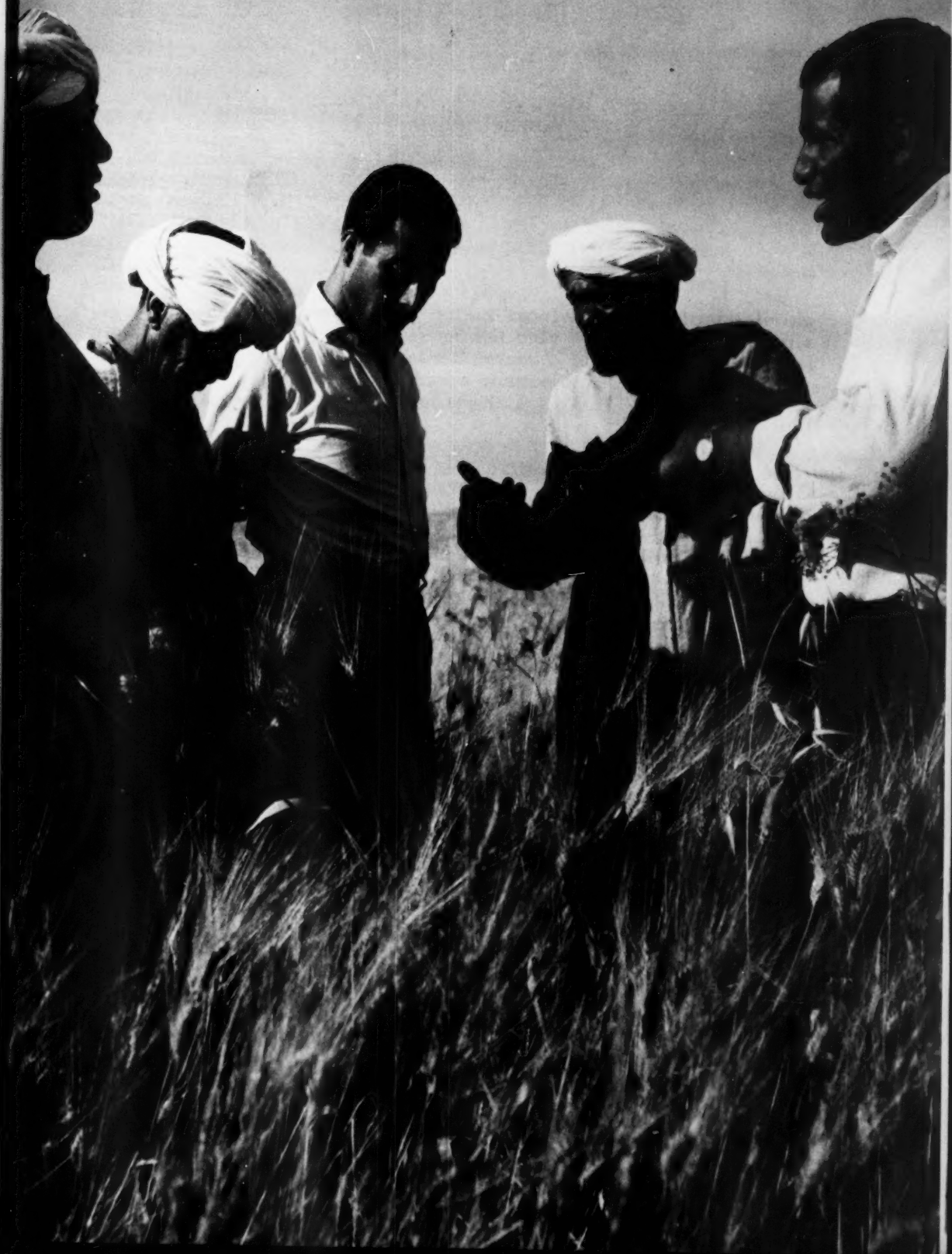
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FARMERS AND INNOVATION



THE MANAGER OF AN AGRICULTURAL EXPERIMENT STATION
IN MOROCCO SHOWS A GROUP OF FARMERS THE
ACCELERATED GROWTH IN WHEAT DUE TO FERTILIZER.
(PHOTO: FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS)

RISK, UNCERTAINTY, AND THE SUBSISTENCE FARMER

Clifton R. Wharton, Jr.

[A subsistence farmer whose output is close to minimum living standard levels must be concerned not only with the most probable level of output using a new method or crop, but also with its range of variability. If he thinks it has a chance of leaving him below his minimum level, then he will not try it.]

Village-level economies operate much as self-contained, self-sufficient economic enclaves with communal goals, institutions and processes designed far more for the preservation of human life than for development. Since in its earliest phases, sedentary agriculture is a productive process whose product may be eaten by the producer, there is inevitably a strong attachment by the peasant farmer to the goals, institutions, and processes associated with the economy, society, and polity of the village.

Despite the almost infinite variety of village-level institutions and processes to be found around the world, they have three common characteristics which are pertinent to change: 1) they have historically proven to be successful, i. e., the members have survived; 2) they are relatively static, at least the general pace of change is below that which is considered desirable today; and 3) attempts at change are frequently resisted, both because these institutions and processes have proven dependable and because the various elements constitute something akin to an ecologic unity in the human realm.

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The Responsiveness of Subsistence Farmers

The earliest characterizations of subsistence or traditional farmers described them as technologically backward, with deficient entrepreneurial ability, and with limited aspirations. The influence of limited aspirations is best summarized in the colonial stereotype of the "lazy natives" who refuse to work for an income beyond what they require for their subsistence. Economists labeled such behavior the "backward bending supply curve of labor." Other social scientists, more culturally sensitive and empathetic, viewed such behavior as merely instances where non-economic variables dominated and swamped economic factors favorable to economic maximization.

Interestingly, these early views of limited or negative peasant responses to economic opportunity were held by many individuals who were witnesses to or participated in instances of massive "response" by subsistence and peasant farmers to improved economic opportunities. During the colonial period, in most instances, the economic opportunity was the dynamic development of new markets in the metropolitan country for the beverages, food and industrial raw materials which could be produced in the colony. Some but not all of the rapid dynamic response in these cases could be explained by the coercion of colonialists, or by the development of infrastructure facilities by the colonial power, or by a crop's promotion by organized interest groups.

More recently, the idea of an economically inert peasantry has been seriously challenged. First, there are those economists led by Professor Jones [1960] and Professor T. W. Schultz [1964], who find ample evidence that subsistence farmers are economic men who do maximize in the utilization of their available economic resources given the available technology. Such farmers may be operating at low absolute levels of production but none-the-less they are optimizing at the ceiling of the available technological possibilities. This group argues that what is fundamentally lacking is improved technology. The obvious solution under such circumstances is to give first priority to the development of new technology to alter the production possibilities.

Second, a large number of economists have been conducting rigorous empirical research to determine whether or not such farmers respond to economic incentives. Despite the varieties of empirical and analytical measures used and crops involved, the overwhelming evidence indicates that subsistence and semi-subsistence farmers do in fact respond to economic incentives. They increase the production of those crops whose relative economic returns have improved, and decrease those which have become disadvantageous. Some of the observable response has come as a result of greater intensification

in the use of available resources without any significant alteration in the existing technology; others have come through the adoption of new techniques and practices.

Despite all this new evidence, there is equally ample evidence, usually in semi-anecdotal or case study form, where farmers have seemingly not responded to an "obvious" economic opportunity. Explanations of such cases vary. Some analyses rely upon non-economic explanations—the indigenous culture militated against the new practice; there were serious religious prohibitions which would prevent the adoption of a new technology; higher production would disrupt the fabric of the traditional society. Others find that upon closer examination the economic advantages turned out to be illusory—the landlord secured all the gain; the moneylender skimmed off the cream; the government guaranteed price was not in fact paid; the cost structure made the new innovation unprofitable.

The current pressures of burgeoning population on world food supplies have heightened the need for more rapid economic responsiveness and the more rapid adoption of new technology. Improved understanding of the resistances to adopt or to respond are becoming critical. One set of explanatory variables which deserves more rigorous study is the influence of risk and uncertainty juxtaposed against the subsistence levels of living and production of such farmers. Risk factors are not predominant or exclusive influences in the adoption process; it is merely that their greater specification will facilitate their inclusion with other equally important factors.

The Causes of Risk and the Sources of Uncertainty

A basic distinction relevant for the decision-making framework of the subsistence farmer is between: 1) those future events to which he can assign probabilities based upon past experience or personal knowledge; and 2) those future events to which he cannot assign probabilities, or where the probabilities offered are not derived from his personal experience but are based on external knowledge provided by others.

Even the most illiterate peasant farmer has a knowledge of the probabilities which attach to his current, traditional practices. These relate to three major sources of year to year variability. First, the farmer faces yield variability. Actual field or barn yields obtained are a function of a wide range of variables—sunshine, humidity, rainfall and even their incidence and timing during the cropping season; pests such as birds, rats, worms; blights, fungi and viruses; and even the unpredictable acts of God and man such as wars, insurrections, and revolts. Second, there is cost variability. Even in subsistence and semi-subsistence type agriculture there are

inputs required for production which are purchased—ranging from minor farm tools and fertilizer to oxen rental and hired labor. Whether or not actual cash is employed in the payment process is inconsequential. The critical issue is the variability in the incidence of such costs. The typical farm decision-maker faces expenses which tend to fall into two categories: those which are subject to his decision-making control, and those which are outside his control. In both cases, predictable and unpredictable probabilities are involved, i. e., risk and uncertainty. Family labor is fundamentally subject to the control of the farm decision-maker, but its utilization is affected by illness and even the availability of off-farm employment. The costs of farm product processing such as milling, off-farm storage, transport to market and interest on loans are outside his control, although knowing what these costs were in previous years helps him in formulating the probabilities. Third, there is a product price variability. Choice of crop and crop combinations as well as intended levels of output are based upon price expectations. The divergence between expected prices when crop choice and planting decisions are made and actual prices after harvest may be considerable, both positively or negatively.

The critical element is that these three variabilities combine in any given crop period to affect the net return to the farm family. The extent to which the farmer can reduce unintended fluctuations in each category is quite limited, but every effort is made to reduce those subject to his control. Historical knowledge on the past variabilities in each does exist, and he takes these into account—whether it is distrust of assured government prices, or fear of a locust cycle.

Interaction of Risk, Uncertainty and Subsistence on Technological Innovation

Any new technology or practice has associated with it some expected probabilities for yields per acre and consequent income figures. Extension workers or salesmen who are promoting new techniques often present them in terms of average (sometimes maximum) yields obtained at an experiment station. But the typical subsistence farmer has his own subjective rate of discount for such probabilities. He has learned from bitter experience to be wary of new methods which as he sees them have been insufficiently adapted and evaluated for his particular situation, and which may not perform in his fields as promised. The farmer, in deciding whether to adopt an innovation, may be seen as making a choice: on the one hand he estimates the most probable yield from a new technique, and the range of variability around this expected figure; on the other hand, he uses as a basis for comparison the expected yield from the familiar method he has been using, and the much narrower range of variability around that expected level. In short, he compares not only the levels of expected

net yields, but also the reliability with which these yields can be expected, as he sees it.

Let us assume we are dealing with a subsistence farm family which consumes, say, 80 percent of its production in the average year. This consumption is fairly constant; in good years the farmer may have some surplus produce to sell, and in bad years little or none, but at least his family is fed. Such a consumption level can be regarded as his minimum subsistence level, i. e., a level he will strive not to fall below. This definition of a minimum subsistence level is not purely physiological: the farmer's notion of a minimum is likely to be somewhat above that which will barely sustain life, but below the level of nutrition adequate for maintenance of a desirable standard of physical exertion. Farmers' ideas of minimum tolerable levels may vary quite a bit from place to place, from farmer to farmer, and through time. But, when a farmer's output comes close to what he considers as his minimum standard, then his behavior as a producer is affected.

When the subsistence farmer confronts a possible innovation, he will be concerned with two questions: 1) Will the new method, taking its probable costs into account, produce an expected yield appreciably higher than his old method? 2) Is there a reasonable probability that something will go wrong, and that the new method will result in a net yield below his minimum subsistence level? Even if the answer to (1) is yes, he will not change his method unless he can also answer (2) in the negative. Thus, the closer his current output is to his minimum subsistence level, the more conservative he is likely to be. The more unfamiliar the proposed innovation and/or the change agents concerned with it, the more cautious will be the farmer's approach.

However, if he can be convinced that the new method is not only better but reliably so, and that its probable negative variability will still leave him better off than he was before, then he is most likely to make the change. A good illustration of this point may be seen in the table below, where objective figures on variability (cross sectional) are presented: although the farmers' subjective estimates of variability cannot be recorded, the impact of experiences in various places should bring these subjective estimates close to the objective realities.

Example of Rice Yields

The recent experience with the new rice varieties from the International Rice Research Institute is perhaps indicative. The rapidity with which the new varieties (especially IR-8 and IR-5) have been spreading in Asia refutes the stereotype of the non-economic peasant.

The Philippines has been a rice importer—some 230,000 tons annually from 1961 to 1967. The very rapid adoption of the new high-yielding varieties first introduced in 1966 has already made the Philippines self-sufficient in rice for the first time in recent history.

The statistical variance in yields per hectare associated with the newer varieties is considerably larger than with the traditional varieties. If the average yields for the new and old varieties had been fairly similar, then the average farmer would probably have resisted adoption. What is especially significant in the present case is not merely that the average yields with the new varieties are higher, but that the negative standard deviation for the new varieties is higher than the average yields of the old traditional variety.

Average Yields of IR-8 and Local Rice Varieties
in the Philippines, Dry and Wet Seasons
1966-67*
(Metric Tons per Hectare)

| | <u>-SD_x</u> | <u>\bar{X}</u> | <u>+SD_x</u> |
|-------------------|------------------------|-----------------------------|------------------------|
| <u>Dry Season</u> | | | |
| IR-8 | 3.24 | 5.86 | 8.48 |
| Binato | 1.51 | 3.17 | 4.83 |
| <u>Wet Season</u> | | | |
| IR-8 | 2.59 | 4.49 | 6.39 |
| Local | 1.00 | 2.32 | 3.64 |

*Data supplied by the International Rice Research Institute, Los Banos, The Philippines.

This helps to explain the startling phenomenon currently taking place with the "Green Revolution"—the rapid adoption of the new high-yielding varieties of wheat and rice.

Some Puzzles and Paradoxes Explained

The above analysis may help to explain a few puzzles and paradoxes commonly encountered with technological innovation in the developing world.

Differential adoption within same community. In many agricultural areas, one can find farmers who have adopted a new innovation coexisting with neighboring farmers who have failed to adopt even though the latter see the new technology every day and are aware of it. "Demonstration effects" and "neighbor effects" seem to have no impact.

Food staple vs. non-food staple variations. A common experience is a differential resistance to technological adoption between staple and non-staple food crops. Technological innovation tends to move more rapidly among farmers specializing in non-food staples (especially commercial crops) than is true with food staples.

The "dual farmer." One frequently encounters farmers who grow both a food staple and a non-food staple. They are willing to innovate or to employ a new technology with a commercial crop but persist in traditional practices with the food staple.

New crops vs. old crops. Another common observation has been that the introduction of new crops requiring new technology seems to be easier than changing the technology of a traditional, well-established crop.

In each of the four cases, a good deal of the variation in adoption can be attributed to the relationship between subsistence standards of living, and the expected variability in output of the food staple under the new technology. In the first case, for example, the non-adopters are most frequently those farmers who are less commercial (both in product and input) and whose resources relative to their minimum subsistence standard of living are extremely close. Where the proposed innovation and its associated variability exceeds the minimum subsistence level, as was the case with the new rice varieties in the Philippines, then adoption proves to be swift.

Some further implications of this analysis may be outlined. Given a close historical relation between annual food output and a farm family's minimum subsistence level, the degree of risk aversion—and thus the extent of resistance to innovations—will be reinforced by five factors:

1. the greater the concentration on food crop(s) in the farm;
2. the lesser the availability of other food sources;
3. the lesser the opportunities for alternative employment of family labor, or of other farm resources;
4. the tighter the capital rationing facing the farmer, and the higher the interest rate he must pay;
5. the closer the value of the family's minimum subsistence level is to the value of the family's net worth (assets minus debts).

Program and Policy Implications

If risk and uncertainty are as important in the context of subsistence as indicated, then certain steps are required to assure a greater rapidity and extent of adoption of new technology.

1. Information on the variability of any new technology is as important as its average performance. Any determination of the economic feasibility of a new practice or technique should pay equal, if not more, attention to the variability in yields, especially the lower deviations as they relate to minimum subsistence standards of living of potential innovating farmers.

2. In developing new technologies, agricultural research organizations should recognize the importance which subsistence farmers attach to the variabilities associated with any possible innovation. Plant breeders, for example, should pay greater attention to those specific characteristics which may help to reduce negative deviation and offer greater dependability.

3. Where only a narrow range covers the minimum subsistence standards, levels of living, and physiologic minima, programs designed to diffuse new technology need to pay much greater attention to methods for "risk insurance" or assuring the peasant who innovates that failure (i. e., an output falling below his minimum subsistence standard) will not result in a major penalty, viz. loss of life or loss of property or indebtedness. Existing social structures and institutions (viz. extended family) which already provide some degree of "risk insurance" should be recognized as such and wherever possible treated as complementary to any new insurance system.

4. Methods of technological introduction and trial in a peasant community should recognize that in the early stages the typical farmer attaches a subjective variability to the expected yield of the new technology which is considerably wider than the true one. Extension and information measures should concentrate just as much on reducing this subjective variability in the minds of potential innovators as on spreading knowledge about the average or maximum yields. Assurance as to the dependability of the practice or technology may be more important to the peasant farmer than its dramatic output possibilities.

[Excerpted from "Risk, Uncertainty and the Subsistence Farmer: Technological Innovation and Resistance to Change in the Context of Survival," a paper presented at the Joint Session of the American Economic Association and the Association for Comparative Economics, Chicago, 28 December 1968, pp. 1-2, 9-12, 23-48, and 50-52.]

AGRICULTURAL INNOVATIONS: LEADERS AND LAGGARDS

N. S. Shetty

[The time pattern of agricultural innovation, based on an investigation of 270 rice farmers in two villages in south India, reveals that it is the larger, wealthier, more literate and younger farmers who lead in the innovating process. The adoption period varies from innovation to innovation, being longer for improved seeds and shorter for fertilizers and the Japanese method of paddy cultivation.]

What prompts a farmer to substitute a new technology for one with which he is familiar? This question is crucial in the context of the new strategy for agricultural growth embodied in the introduction of high-yielding varieties of improved seeds, chemical fertilizers and insecticides. It is pertinent to know whether we can reduce the time lag between the research results obtained on experimental farms and their transmission to actual cultivation.

We will attempt first to determine the time pattern of adoption of innovations, and second, to locate and examine the factors which help or hinder their acceptance. As regards the first, we are also interested in analyzing the sequence of awareness, acquaintance and adoption, and the time lag involved between the several stages of adoption. With respect to the second, we focus our attention mainly on the socio-economic characteristics which differentiate those who are foremost from those who are laggards in adopting innovations. The data used in this study are part of the field investigation conducted in 1965 in two villages of South Kanara district of Mysore State, viz, Haleyangadi and Mundkoo. The district lies along

the West Coast and cultivation in it is mainly monocultural rice. The investigation covered all the 270 farmers in these villages.

The Adoption Process

Three important innovations—improved seeds, chemical fertilizers and Japanese method of paddy cultivation—were selected for this study. These were selected because they are rated highly in their contribution to farm production and because a sufficiently large number of farmers have adopted them during the last 15 years. Besides, these practices can be regarded as technically adoptable by all sections of sample farmers—small, medium and large.

A study of the adoption of an innovation is essentially a study of farmers' decision-making. The various stages of decision making are grouped into three: awareness, acquaintance, and adoption. 1) Awareness: the farmer is initially exposed to an innovation. He learns of its existence but knows no details. 2) Acquaintance: the farmer becomes interested in the innovation and seeks additional information about it. 3) Adoption: he decides to take action, and accepts whatever consequences the action may entail.

Inner-Innovation Variance

Table 1 sets out the number of farmers who went through the process of awareness, acquaintance and adoption stages in adopting chemical fertilizers each year. At first, only a few farmers become aware of (or acquainted with, or adopt) an innovation, then more and more farmers pass through the same stages each year until a peak is reached, and the number of farmers in the given process decreases thereafter. Awareness occurs at a more rapid rate than acquaintance and adoption. Similarly, the process of acquaintance is found to be relatively faster than the process of adoption.

Table 2 gives the average time period taken by the farmers to pass through the three stages for each of the three innovations studied. The length of time required for one farmer to progress from awareness to acquaintance is called the awareness-acquaintance period. Similarly, the difference between the date of acquaintance and the date of adoption is designated as the acquaintance-adoption period. The adoption period is the sum of these two time periods.

The length of the adoption period varies widely. Some farmers reported that they adopted improved seed within a year of their becoming aware of its existence; others reported an adoption period ranging from 9 to 12 years. The adoption period differs widely from innovation to innovation, too. The average time period was considerably longer for improved seeds as compared to the other two

Table 1.
Distribution of Farmers at the Awareness, Acquaintance
and Adoption Stages for Chemical Fertilizers

| Year | Awareness | | Acquaintance | | Adoption | |
|------|---------------|-------------------|---------------|-------------------|---------------|-------------------|
| | No. Each Year | Cumulative Number | No. Each Year | Cumulative Number | No. Each Year | Cumulative Number |
| 1950 | 4 | 4 | 0 | 0 | 0 | 0 |
| 1951 | 5 | 9 | 5 | 5 | 3 | 3 |
| 1952 | 15 | 24 | 4 | 9 | 2 | 5 |
| 1953 | 18 | 42 | 5 | 14 | 4 | 9 |
| 1954 | 38 | 80 | 8 | 22 | 7 | 16 |
| 1955 | 48 | 128 | 18 | 40 | 10 | 26 |
| 1956 | 39 | 167 | 18 | 58 | 12 | 38 |
| 1957 | 42 | 209 | 31 | 89 | 15 | 53 |
| 1958 | 26 | 235 | 24 | 113 | 21 | 74 |
| 1959 | 13 | 248 | 18 | 131 | 17 | 91 |
| 1960 | 5 | 253 | 16 | 147 | 22 | 113 |
| 1961 | 1 | 254 | 9 | 156 | 10 | 123 |
| 1962 | 0 | 254 | 5 | 161 | 3 | 126 |
| 1963 | 0 | 254 | 2 | 163 | 1 | 127 |
| 1964 | 0 | 254 | 1 | 164 | 3 | 130 |

innovations, perhaps because of the intrinsic nature of the innovations themselves. For example, even though the use of improved seed is relatively simple in nature, compatible with the farmers' past experience and requires small amount of initial capital, the rate of return on investment in it is relatively very low. On the other hand, though

"availability" and "technical know-how" difficulties obstruct the immediate adoption of chemical fertilizers, the rate of profitability from the change is very high and more attractive.

If the supply imperfections and distribution defects are uniform for all in a community, why do

Table 2.
Average Time Periods Required in Years

| Period | Improved Seed | Chemical Fertilizer | Japanese Method of Paddy Cultivation |
|---------------------------------|---------------|---------------------|--------------------------------------|
| 1 Awareness—Acquaintance Period | 1.49 | 2.57 | 1.36 |
| 2 Acquaintance—Adoption Period | 5.71 | 2.56 | 2.64 |
| 3 Adoption Period (1 + 2) | 7.20 | 5.13 | 4.00 |



Left: Rice grown from superior (IR-8) seeds.
(Photo: AID)

Right: Farm worker applying chemical fertilizer. (Photo: AID/India)



Left: Transplanting rice with Japanese method of paddy cultivation.
(Photo: AID/India)

some farmers tend to be relatively quicker than others in introducing an innovation? To answer this question, it is necessary to determine the characteristics of early and late adopters. Farmers were divided in three groups, based on the time distribution of adoption: innovators whose adoption preceded the average year of adoption for the group by one standard deviation; imitators, whose adoption followed later; and non-adopters.

Characteristics of Innovators

Most of the variables selected do not need particular explanation. Size of holding is brought in by two variables, area of owned holding and cultivated holding. Education is taken into account in terms of educational level of farmers as well as the literacy position in the family as a whole. Since income could not be directly included, a proxy is used to represent it—a very rough indicator of assets. Subsidiary occupation is included in the form of scores for different types of occupations, scores which reflect not so much the income potential of the occupations as their influence on farmers' knowledge of and contacts with the outside world. For the variable "socio-economic status," we have taken simultaneous consideration of caste and size of cultivated holding.

Table 3 provides a summary of selected characteristics of innovators, imitators and non-adopters. To identify the factors that are significant or insignificant in the adoption of innovations, we tried X^2 (chi square) analysis of data. Size of farm, education, subsidiary occupation, and socio-economic status seem to have the greatest influence on farmers' speed of response to innovation. These factors presumably determine farmers' access to information and to the supply of innovations. In the case of chemical fertilizers, besides these factors, the size of owned holding, extent of irrigation, tenancy, and index of assets are also found to be decisive in governing farmers' adoption behavior. Conceptually, these factors determine farmers' ability to invest and ability to adopt effectively. One plausible explanation would be that investment needs of the improved seeds and Japanese method of paddy cultivation are modest, and hence their adoption does not encounter serious obstacles in terms of farmers' ability to invest and ability to adopt. In the case of chemical fertilizers, on the other hand, these factors are more active in giving rise to differences in time of adoption.

Judged by the chi square analysis, age of the farmer, consumption units in the family (family members, with younger children counted at lower values) and fragmentation (number of plots per acre cultivated) seem to have the least influence on farmers' innovative behavior. It can be seen that innovators differ from imitators and non-adopters on a number of socio-economic characteristics. More

Table 3.

Average Values for Characteristics of Innovators, Imitators, and Non-Adopters

| Characteristics (units) | Improved Seed | | | Chemical Fertilizer | | | Japanese Method | | | All Farmers |
|---------------------------------------|-----------------|----------------|------------------|---------------------|--------------------|--------------------|--------------------|--------------------|--------------------|----------------|
| | Inno- vators | Imi- tators | Non- Adopters | Inno- vators | Imi- tators | Non- Adopters | Inno- vators | Imi- tators | Non- Adopters | |
| (Numbers in group) | (29) | (172) | (69) | (16) | (114) | (140) | (34) | (47) | (189) | (270) |
| Socio-economic status (score) | 11.56* | 6.98* | 3.18* | 12.38* | 8.26* | 5.10* | 11.56* | 9.48* | 5.24* | 6.77 |
| Education of farmer (years) | 9 ⁺ | 4 ⁺ | 2 ⁺ | 10 ⁺ | 3 ⁺ | 2 ⁺ | 10 ⁺ | 5 ⁺ | 2 ⁺ | 3 |
| Level of schooling in family (years) | 6.76* | 3.68* | 1.98* | 5.40* | 4.12* | 2.58* | 5.42* | 4.75* | 2.54* | 3.44 |
| Family literacy (%) | 88.6* | 63.6* | 49.5* | 80.5 ⁺ | 67.5 ⁺ | 56.3 ⁺ | 78.4 ⁺ | 72.5* | 56.3* | 65.6 |
| Area owned (acres) | 3.98 | 2.20 | 1.10 | 4.08* | 2.98* | 0.90* | 3.56 | 2.98 | 1.58 | 2.12 |
| Area cultivated (acres) | 7.98* | 3.32* | 2.48* | 9.35* | 3.48* | 2.73* | 5.59 ⁺ | 3.76 ⁺ | 2.94 ⁺ | 3.60 |
| Tenancy (% of cultivated) | 26.36 | 54.69 | 79.82 | 16.78 ⁺ | 54.47 ⁺ | 67.75 ⁺ | 36.46 ⁺ | 63.26 ⁺ | 72.56 ⁺ | 67.95 |
| Irrigated (% of cultivated) | 44.24 | 39.40 | 36.84 | 48.11* | 42.53* | 33.69* | 50.58* | 44.44* | 34.67* | 39.41 |
| Fragmentation (number) | 3.20 | 3.28 | 2.96 | 3.08 | 3.16 | 3.31 | 3.14 | 3.38 | 3.16 | 3.18 |
| Assets per capita (rupees) | 22,535 | 4,326 | 2,976 | 25,494 ⁺ | 5,733 ⁺ | 3,749 ⁺ | 18,976* | 7,586* | 3,246* | 5,163 |
| Consumption units in family (numbers) | 6.99 | 6.18 | 6.24 | 6.82 | 6.38 | 6.25 | 6.78 | 6.52 | 6.28 | 6.40 |
| Age of farmer (years) | 46 | 45 | 52 | 48 | 49 | 52 | 47 | 51 | 50 | 50 |
| Subsidiary occupation status (score) | 3.82* | 2.94* | 2.11* | 3.94* | 3.02* | 2.34* | 3.82* | 3.58* | 2.48* | 2.82 |
| Extension contacts (score) | 6.41 | 3.05 | 1.99 | 7.06 | 4.96 | 1.34 | 8.76 ⁺ | 6.06 ⁺ | 1.38 ⁺ | 3.08 |

*Statistically significant at 0.01 probability level.

⁺Statistically significant at 0.05 probability level.

respondents with an average size of farm of 7 acres or above are innovators than those with an average size of farm less than 5 acres. Similarly, more respondents with average assets of Rs 15,000 or more are found to be innovators than those with average assets of less than Rs 5,000. A majority of the farmers with an average size of farm less than 3 acres and/or with an average wealth of less than Rs 5,000 are found to be either imitators or non-adopters. As regards education, the data show that innovators have a higher level of formal education than imitators and non-adopters. Most of the innovators are found to be in the higher educational group, particularly above 8th grade. The majority of non-adopters are illiterates. Compared to non-adopters and imitators, innovators have higher owned land holding, more assets and more contacts with extension agencies. Even in case of age, innovators are found to be relatively, though not significantly, younger than imitators and non-adopters.

Strategy for Accelerating Adoption

The process of adoption which emerges from this analysis does not appear to be one in which "innovations come in swarms;" nor one in which farmers are advancing on a straight line in a military fashion to adopt innovations. The process seems to be one of gradual adoption of new techniques through the innovators-imitators-laggards sequence.

If the basic problem in planning is to narrow the time lag between the availability of the results of technological research and their adoption, extension agencies have to take into consideration two methods of speeding up the process of adoption among farmers. One method is to shorten the time lag between the first appearance of an innovation in the village and awareness of it by the farmers. Another is to speed up the process of adoption after the individual is aware of a particular innovation. For the former, the propaganda through mass media communication agencies may play a better role; but for the latter, demonstrations and direct personal contacts of extension agencies with farmers are indispensable.

Regarding factors influencing adoption, it is found that variation in time of adoption is mainly due to differences among farmers in relation to access to information and supply. The difference in ability to adopt seems to have less importance. In the region of study, the latter factors are still dormant due to the prevailing wide differences in access to information and supply; as these differences get removed through extension efforts, the ability factors may become more operative in giving rise to differences in time of adoption. It may then take much ingenuity by extension agencies to break up the crust of non-progressiveness and to diffuse new techniques from the farmers where their adoption is most likely to those where their adoption is most needed.

If we consider that the innovators play an important role in the process of change by demonstrating innovations to other farmers in their villages, it is important to determine their characteristics. In the absence of radical changes in the structure of farm production and institutional set-up, the adoption and diffusion process of innovations can be accelerated only if initial efforts are concentrated on the farmers who are inclined towards innovation.

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A GAME AGAINST NATURE: STRATEGIES OF SECURITY

Michael Lipton

[Peasants are motivated by many different things; their behavior shows greater concern for security than for maximum profits. This emphasis can explain apparently irrational resistances to change.]

We can't explain Indian or African farming without a theory of decisions. If we make do with a hypothesis that peasants act as if they maximize profit, we beg the important questions about agricultural development. Now I'll look at some theories of how farmers make decisions, against the background of the Indian village of Kavathe, where I recently spent a cropping season of seven months.

Kavathe consists of about 120 farm families, owning an average four and a half acres each. Most families own their farms; sometimes they exchange labor with their neighbors. The main crop is millet. The village is near the Indian average for poverty, as well as for indicators of development like irrigation and distance from the nearest big town, Poona, 50 miles away. About one in four adults in Kavathe can read—again near the Indian average. There's a school attended by most children from the ages of seven to twelve, and a dispensary five miles away. There are ten castes including Brahmins and Untouchables, but 80 of the 120 families belong to the main farming caste of the region, the Marathas.

Kavathe is fairly typical. The farmers are shrewd, open, aware of why they farm their land as they do,

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and they are motivated by many other things than the search for profit.

First, the farmers accept constraints on their behavior that reduce profit—and aren't even required by law or by the moral code. A typical profit-reducing constraint in Kavathe, as in the entire Hindu and Moslem world, is the way land is inherited. Father wants all his sons to get some land, to insure them against the servile and insecure status of a landless laborer. But father also wants to give each son a fair share of good land. So he splits his holding into several plots—some good and some bad for each son. After a few generations of this, each farmer's holding is a patchwork quilt of plots, too tiny to be ploughed or weeded efficiently. Plainly, the village needs to exchange plots. Yet the peasants don't do this for themselves—and it's not because of any moral attitude or legal statute. Land confers too much status and security for the peasant to take risks with it; and it's a huge risk to swap plots, even with a neighbor.

Second, you might expect that the farmers' long experience of an unchanging environment had produced agreement on practices expected to get as much profit from the land as possible: in fact, there's "agreement" on some very bad practices indeed. The farmers heap up their manure, rather than taking time to make a proper compost pit, which would preserve the nitrogen in the manure. These heaps made sense 30 years ago, when the farmers of Kavathe learned their job. Then there was plenty of land for the cows to graze in, and therefore plenty of manure—but not enough labor to dig a pit. Nowadays, though, there's plenty of labor, but a shortage of land, and things like manure-heaps don't make sense any longer. Another reason why the farmers of Kavathe persist in some practices that reduce profit lies in the quest for security. When sowing, most farmers mix their millet seed with bean-sprouts. These aren't worth much, but they're very robust in the face of water shortage. If the peasants sowed only millet they'd make more profit, averaging the good years with the years of poor rainfall; but in the dry years they'd go very hungry indeed.

Third, there's disagreement on important aspects of farming—even among farmers with similar resources. For instances, on the soils of Kavathe it pays to sow less millet per acre where the soil is good, because the plants grow strongly and may kill each other in the fight for space and light if they are sown too thickly. Yet only one farmer in six reduces the seed rate on good soil. Half make no change, and one-third actually sow more seed per acre on good soils.

People tend to see the peasant as a simple man taking simple decisions in a simple environment. But if we list the inputs, techniques

and outputs among which he has to choose, and the ways in which his preference may be slanted among status, income, leisure, and security, we see that the decision problem is as complicated for an Indian farmer as for a steel firm or even a national planner. However, once we allow for security in our explanation of peasant behavior, much of it falls into place. For instance, most Indian tenants prefer to pay a big share of the crop as rent, rather than a more moderate, fixed cash-rent—why? Because it insures him against bad harvest, by reducing his rent liability when output is low; and against a low price for his crop, because he doesn't need to sell it to raise cash to pay the rent. Economic planners don't like share-rents; apart from cutting the peasant's profit, they eat into potential farm output. A tenant won't be keen to dig a well if half the extra crop goes to the landlord as share-rent. Once the planners see that the peasant needs insurance, they'll understand his readiness to pay a high crop share. Then they can try to change it, perhaps by providing alternative means of security.

The Indian peasant may be seen as playing a game of chance against nature. Almost every farmer in Kavathe has discovered a set of rules to insure survival: what I call a "survival algorithm," a kind of special calculation for the game. That is, he's found a group of practices, a group of decisions about allocating farm resources, which allows him just tolerable levels of profit, security and status. This survival algorithm allows him to muddle through in good years and bad alike. Naturally he's reluctant to change it.

Fear of disrupting this algorithm explains why villagers are so often reluctant to adopt farming innovations. Just as the American businessman fights harder to raise his market share when it's been falling than when it's not being threatened, so the Indian villager needs a big incentive to take risks with an allegedly improved practice so long as the old practices he knows and trusts don't lead to an actual fall in living standards.

An apparent irrationality is found in the persistent differences in the ways that similar peasants deploy similar resources; each has his own learned and inherited survival algorithm. In any situation, only one group of practices can maximize profit, but many different groups of practices can give tolerable results. And if safe tolerable results are what each poor farmer is after, each set of practices, once found, will be highly stable.

This is partly because farming is so complicated. A farmer whose neighbor gets a higher output from similar resources, may know some of the practices where he differs from his neighbor. But there's likely to be a whole batch of practices which he adopts and his neighbor doesn't—and vice-versa. If the farmer sticks to his



An Indian farmer ploughing in his own way. (Photo: AID)

own algorithm in some respects, but adopts bits and pieces of his neighbor's algorithm too, the results might be a disastrous mess.

When a planner in India or Africa tries to improve farm practices, he should look for the preferences that make one group of farmers good at ploughing, another group good at weeding, and so on. The search for an all-round paragon, "the progressive farmer," is too crude to succeed.

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ECONOMIC TRANSFORMATION OF THE WANJI

William Garland

[An isolated tribe in the mountains of Tanzania moved rapidly from extreme poverty to relative affluence with little initiative from government or other outside sources. Their Chief was the dominant agent of change. His involvement remains necessary for the success of any project.]

The Wanji are a Bantu-speaking tribe of about 20,000 inhabiting two small, scoop-shaped basins on the northern edge of the Elton Plateau, north of Lake Nyasa, in Tanzania. Ten years ago the Wanji were isolated from the outside world by the 3,000 foot drop on the north side, on the east by radically broken, uninhabited mountains, on the south and east by the uninhabited moorlands of the higher plateau. There were no roads to the outside. The only means of transportation was on foot.

A decade ago the Wanji had no cash income. They went naked in a cold climate and lived in dark, crowded, unsanitary, wattle-and-daub huts. There were no foods but maize, millet and greens; meat was almost unobtainable, and there were few skins for clothing or bedding. There were few cattle, and only a very little cloth was brought back to Uwanji by the people working outside their own land. There were virtually no hand tools and no skilled artisans. The out-migration from Uwanji was at an annual rate of over a thousand persons in the 1950s.

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Above: A decade ago—daub and wattle house.

Below: Today's modern house, with bags of produce awaiting pick-up by truck.



A Decade Later

The Wanji are now one of the more prosperous of rural populations in Tanzania. The 1,800 members of the pyrethrum growers' cooperative alone divided among themselves over two million shillings [\$286,000] in income during the past year. Others received income indirectly from this source as retail merchants, truckers, artisans, millers, teachers, preachers, and agricultural workers.

The former isolation of Uwanji has been breeched by a road down the scarp to the Great North Road, and Uwanji is now in communication with the commercial centers of Tanzania and the outside world. Another road is now under construction which would connect the other of the two Wanji basins to the Great North Road. All the villages of Uwanji are now connected by motor roads. Bicycles, radios and wrist watches are now common, and several Wanji own their own trucks and motor cars. Every Wanji now has some good clothing, many men have warm coats, and all have money for detergents and the vanity to use them. Wattle-and-daub houses are now giving place to larger, sun-dried brick or fired-brick houses with metal roofs, ceilings, windows, and cement floors. Most Wanji now have beds and other furniture. Many families have hand driven grain mills and access to motor driven commercial mills. One of the "exports" from Uwanji is hides from the many cattle slaughtered for meat; most villages have butchers. Now there are skilled artisans in furniture making, potting, basket making and in all phases of house-building.

Almost every village now has a two-grade school; most larger villages have schools through grade four, and there is one boarding



An enterprising Wanji merchant spreads his wares outside the cooperative building when payments for pyrethrum sold through the cooperative are about to be made.

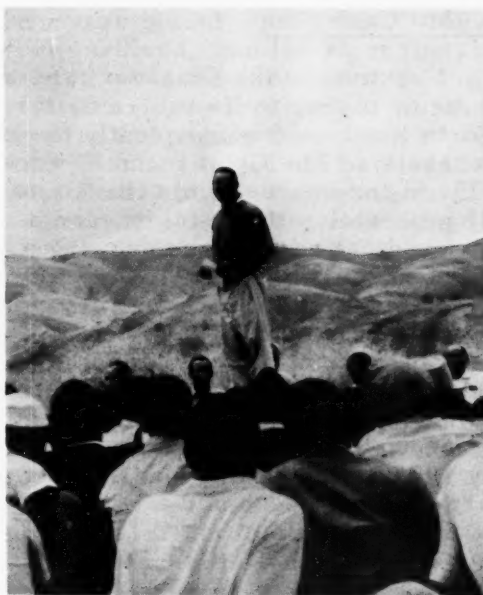
upper primary school, i. e., grades five through eight, in central Uwanji. There are now three dispensaries and a hospital; another hospital and another dispensary are being built. There is no more out-migration from Uwanji; instead, a large proportion of the Wanji who had gone outside to work have returned. Moreover, many people from other tribes have immigrated, among whom the Kinga and Nyakyusa are particularly numerous, especially as transient house-builders and field laborers.

The Wanji are not a progressive people, however. It is easy to be deceived about this because of their recent, spectacular progress, and also because the Wanji profess a kind of Protestant ethic. The Wanji praise persons for their industry, though they themselves are not particularly hard workers. Saving money and investing it in productive resources or in cattle for one's children's marriages is good: but a new wife, a radio, a bicycle or a wrist watch are more immediately satisfying, and saving can always wait a bit longer. In other respects, the Wanji are tolerant to a fault, easy-going and friendly, optimistic; and they are passive and fearful in the face of authority, incapable of organized opposition to authority.

Thus it is not due to Wanji character or world-views that they have progressed. It is not primarily due to either central, regional or district governmental efforts that the Wanji changed in the 1950s, though each has helped some. The Tanzania African National Union (TANU), the only authorized political party in the country, is often involved in progressive schemes; but there was no TANU organization in Uwanji. The Chief of the Wanji was the prime mover in Wanji development.

The Agent of Change

Solomoni Galamtogela Mwalivali, pictured here, is now one of the Assistant Divisional Executive Officers in the Tanzanian civil service; but before there was a Tanzanian government, Solomoni was already paramount chief of the Wanji tribe. To his people, and also to the government personnel in residence in Uwanji, he is still "Untwa," chief, for it is only in this role that he has effectiveness in Uwanji. Chief Mwalivali is a man superbly endowed for leadership, especially in Uwanji. There is no task which he cannot perform more skillfully than anyone else. There is no one who can speak better than he. He is head of the traditional chiefly clan and lineage. He is the leading authority on Wanji custom, law and history. Until recently he was the only person with a cash income of any size, and he still has one of the largest.



By his character, ability, knowledge, use of legal sanctions, and his willingness to make use of this knowledge to play on their credulity, fearfulness of authority, and ideal ethic, he has motivated his people toward progress. However, the qualities and circumstances of the Chief's leadership would probably not have been sufficient in themselves to sustain development over these ten years without a striking success of one of his earliest efforts at development, the cash cropping of pyrethrum.

Following his father's death in 1952, Solomoni found he had become chief of a very rapidly diminishing tribe. Before the exodus was stemmed, in about 1960, more than 2,000 taxpayers were lost from the Wanji rolls (implying 8-10,000 people in all). Since the diminution of the tax rolls was due to out-migration to earn money, Chief Mwalivali saw that he must bring to Uwanji some means of cash income if the tribe was not to disappear altogether. Already the loss of so many of the younger, harder working and ambitious tribal members was having undesirable effects.

A New Cash Crop

It seemed to the Chief that regardless of whatever was to be done to bring money to Uwanji, a motor road giving access to the Great North Road, and consequently to external markets, was an absolute necessity. The Chief found an acceptable cash crop for the Wanji in 1954 in the course of his travels to the district headquarters at Njombe while attempting to plan a motor road out of Uwanji. There he found native farmers growing pyrethrum and selling it at good prices. Since the same crop was being grown by a European farmer on the other side of the Wanji's plateau, it seemed a possibility for Uwanji, so the Chief petitioned the government for enough pyrethrum seed for a trial plot. In 1955 he began his trial pyrethrum plot, and with the aid of a district administrative officer planned a road down the scarp to connect with the Great North Road, then being built to connect all the cities of eastern Africa, from Johannesburg to Cairo. By 1956, work on the road and the planting of pyrethrum by 44 Wanji farmers was begun and a tentative cooperative marketing organization formed.



A field of pyrethrum blossoms on the Wanji plateau.

Both these schemes were commenced against stiff resistance. Denunciation of the road work was particularly strenuous, and the road was built only through use of government force. But the almost immediate success of the first pyrethrum farmers silenced not only the ridicule of the pyrethrum cultivation, but also resistance to the road. Both schemes first met full success in 1958, and from that time forward both have become accepted as necessities.

Pyrethrum daisy blossoms yield a very potent insecticide. The crops bring a good price for the work involved, and the plant finds an ideal environment in the high, moist, cool air and soil of Uwanji. It is easily planted in only slightly raised ridges from either seeds or cuttings. It need not be weeded more frequently than twice a year and is little affected by insect pests. Plantings need not be made but every four years, when the plants finally become unproductive. A holding of 6-10 acres, with three acres (rotated) in pyrethrum, would produce a family income of approximately 3,000 shillings (\$430) per annum plus food under current cultivation practices and prices. This is an income far in excess of the average for Tanzania, especially in rural areas.

Many other successful schemes have been initiated by the Chief. After the success of the road and pyrethrum, all villages have dug furrows to bring water into their villages. The Chief also initiated self-help roads between villages, and self-help schools, medical dispensaries and hospitals. The Chief has persuaded the central government to help with some building materials for the projects and to provide medical personnel for the dispensaries, once built by self-help. The Lutheran Synod of the Southern Highlands of Tanzania has similarly provided trained teachers for the self-help schools. Other such projects have now been begun on the initiative of villagers from the outlying areas of Uwanji.

A recent project of the Chief has been improvement of sanitation and house construction. It is now a punishable offense for a dwelling house to be without a proper enclosed latrine. New house construction must be along regularly laid out streets. Food and beverage vendors are closely regulated about sanitary preparation and display of merchandise.

A result of the success of the pyrethrum program was to insure the authority of the Chief, particularly in regard to development schemes. The enhancement and effectiveness of Chief Mwalivali's authority is shown in two ways: the large number of progressive programs carried out when they were vigorously backed by the Chief, as against no cases of non-compliance; and secondly, the failure of all developmental schemes in Uwanji which have not had the Chief's enthusiasm, two of which are recounted below.

The government attempted to introduce wheat cultivation into Uwanji in 1939, but the program has never developed. At first the Wanji merely ate the wheat seed distributed to them. They were finally persuaded to plant wheat on the third attempt in 1942, and a very small amount has been grown every year since then. The wheat was introduced with the intention of providing a cash crop for the Wanji, and possibly an export crop for Tanzania. However,

wheat has never been anything for the Wanji but a minor porridge grain useful as an infrequent change from the staple maize porridge, and for a short time an item of barter with the lowland tribes. Wheat has never been integrated into Wanji economy despite the easier cultivation and the larger and more assured yields of wheat as opposed to maize or sorghum.

A part of the government's new town plan introduced in 1964 for Matamba, the main settlement of Uwanji, was a closed, piped water system with cement sedimentation basin and reservoir. A special development agent, an American from district headquarters, was sent to oversee the construction of the water system. The Chief explained the plan to the populace. He asked that each man contribute Sh. 5/- and each woman 2/- to pay for materials, and this was readily collected. Since that time, however, the Chief has concerned himself almost exclusively with other matters, and the consequence has been that the populace at large has ignored the water project, despite valiant efforts on the part of both the special and the regular development agents. All there is to show for their efforts after two years is 67 of the more than 700 cement blocks required to build the basin and reservoir.

This result, and several other uncompleted projects, have led the development agents in Uwanji to wait philosophically for the Chief's attention to their projects, for without his active cooperation their efforts are futile.

[Excerpted from a paper presented to the Conference on African Local Institutions and Rural Transformation, Institute of African Government, Lincoln University, Pennsylvania, 20-21 April 1967, pp. 38-45.]

FARMERS' RESISTANCE—TO WHAT?

Francis C. Byrnes

[When farmers fail to adopt innovations recommended to them by extension agents or others, the reasons for such failure may include aspects of the way the change was presented, inappropriateness of the change, and other factors than the much discussed conservatism of the farmer.]

If we review their reports, we might well conclude that the social scientists who study the process related to farmer acceptance of new practices must assume that the major dynamics associated with diffusion in agriculture are limited to the farmer and his environment. There is a sparsity of studies which tried to measure the extent of practice adoption in relation to the technical adequacy of the change agent or the technical appropriateness of the practice advocated.

Perhaps social scientists have avoided such study because they assumed that satisfactory levels of adequacy and appropriateness existed. This situation may occur in developed countries with well-established extension services, but it is extremely unlikely in most underdeveloped areas where the research and extension agencies also are developing. Another problem is that it may be difficult or impossible either to ask or to get reliable answers to questions about such matters. In the Philippines, for example, to challenge the competency of technical personnel would reflect unfavorably on the agricultural colleges and government agencies involved; it is particularly difficult to get reliable information when implying criticism of someone or something.

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Meanwhile, scientists and development personnel continue to document, through study and experience, what they term "resistance to change." In so doing, they reinforce the belief that people basically and inherently resist change. These beliefs, in turn, structure both our perceptions of and our behavior toward other individuals.

Factors Associated with Farmer "Resistance"

Do farmers resist change? Undoubtedly some do, but others do not. More frequently, what they seem to resist is not the change but the manner in which change is presented, or what they perceive the change to be. They also may resist the perceived or actual technical inadequacy of the change agent or the inappropriateness, for them, of the proposed change. If the resistance is based on a valid perception of inadequacy or inappropriateness then even the most competent extension worker, in a communication or methodological sense, will encounter resistance.

But if they resist, do we know why? Traditional orientations, fear of risk and uncertainty, and lack of knowledge or resources explain some resistance, but is it not also possible that a certain percentage (perhaps a highly significant percentage) demonstrate a learned resistance? If this be the case it is important to understand more fully the factors that tend to create resistance among farmers and make them suspicious of change and of the professionals who promote or teach change.

Field experiences of the writer in five southeast Asian countries (Indonesia, Malaysia, Thailand, India, and the Philippines) since 1963 provide numerous examples or confirmations of the extension situation which Agaton Pal describes:

Many extension agents have only a 'book or garden' knowledge of farming. They might have graduated from a college of agriculture, but most of them do not have farm backgrounds. Consequently, these agents do not know enough to make a straight furrow with a carabao and plow; they do not know how to harvest palay with the native scythe used by the farmers.

This lack of skills is further aggravated by the extension agents' ignorance of the farmers' belief-practices regarding protection of crops from insects and pests, improvement of the quality of seeds, harvest procedures to ensure more grains, treatment of the grains to assure palatability, and many other practices which are 'musts' to the farmers. These unscientific or anti-scientific practices are usually not included in college courses.

Extension agents easily run out of contents for their teaching activities. After five or six months of contact with farmers, they realize that in many aspects of farm activities they do not have a more practical and efficient practice to present as an alternative to the farmers' tested experience.

Some diffusion studies in the Philippines provide limited support for the related issues of technical adequacy and appropriateness. The evidence usually emerges as fortuitous or qualitative data in case studies of development projects. Interviews with 45 farm household heads chosen at random in five barrios produced, among other things, the following comments about the extension worker assigned to each barrio.

- He is young compared to the majority of the farmers and so is not too experienced in matters of farming. (27 out of 45)
- He uses (technical) language we cannot understand very well. (33 out of 45)
- He goes by the book and not on what is really happening in the field. (17 out of 45)
- He is not very sure sometimes of what he is advising us to do. (35 out of 45)
- He cannot answer many of our questions. (16 out of 45)

Reports based on studies of the Farm and Home Development Program at the University of the Philippines College of Agriculture, provide additional insights on factors associated with acceptance and resistance among Filipino farmers. Out of 25 farm practices introduced to 380 farmers, Feliciano reports that 8 were adopted by about 40 to 50 percent. Reasons for saying "no" to some practices were: 1) lack of available resources; 2) the seen and proved ineffectiveness of the practice; 3) no relative advantage of the practice; and 4) a general unwillingness to change. In this latter category, mentioned by about 30 percent, were such explanations as: satisfaction with existing practices, and/or to preserve traditional ways in the barrio; fear of the consequences of change; nothing to be gained from change; failure to look ahead, or to see needs changing with the future.

Feliciano says that the majority of the farmers want change, but in increasing numbers they want to know the "why" of a recommended practice as well as the reasons for changing.

Studies by Castillo identify other factors associated with the failure of farmers to accept new practices. Some farmers had difficulty

comprehending cause and effect relationships, e.g., the chickens died from eating insects killed through use of the recommended spray. Some put too much or all of their faith in a single practice, e.g., soil analysis. The farmer's own logic was sound, e.g., "the hybrid corn has tough stalks and the animals do not like to eat it." Or the farmer was not aware of alternatives and sources of information.

Of significance are the ways she documents what we have here called "learned resistance." This can develop through unfavorable experiences with professional workers: "We had an agriculturist in our place, too. He did nothing but sleep." Closely related to this is the farmer's lack of confidence in the extension worker:

The promises that were never intended to be fulfilled, the services that were seldom rendered, and the appointments that were not kept become enduring testimonials to the futility of trusting another worker.

When extension workers demonstrated a readiness to carry on above and beyond the call of duty, the farmers' skepticism was substantially reduced. Actions that were perceived favorably included getting into the paddy to plant rice, remaining in the barrio to work on Sundays and holidays, and arriving for evening classes despite heavy rains and bad roads.

Technical Adequacy, Alone, Not Sufficient

Einsidel, in a series of case studies to selected community development projects in Bantangas Province of the Philippines, illustrates one of the writer's underlying theses—that the technical adequacy of the change agent is a necessary although not a sufficient condition for the success of programs to introduce change. He summarizes the factors blocking success in these projects as including: 1) failure of the technical agents in their promises to the people as well as in their inability to explain the failure; 2) failure of higher officials and authorities to give the explanation and the responsibility to the field workers who could have made the interpretation to the people; 3) laxity and negligence of technicians in agricultural extension and animal industry in the performance of their responsibilities; and 4) lack of support from higher authorities in community development and the technical agents of cooperating agencies.

Niehoff and Anderson, after analyzing 203 case histories of cross-cultural change, concluded that innovation techniques and change agent characteristics were more significant than characteristics of the recipient groups in influencing response to change efforts.

Among the influence sets within the innovator category, four were quite high in correlation with outcome: 1) personal characteristics of the innovator as viewed by the recipient; 2) communication techniques used; 3) utilization of the traditional culture; and 4) the amount of participation obtained.

In passing, they note that the basis of all other innovation techniques is the establishing of effective communication channels—the means by which ideas of the projected change are transferred to the recipient population. Their analyses emphasize the importance, in underdeveloped societies, of three types of communication: 1) personal, face to face; 2) demonstrations which pragmatically show the advantages of the change; and 3) feedback, the communicated reactions of the recipients to the innovator in response to the change effort.

Response to Economic Incentives

Also contrary to the notion of farmer resistance to new ideas is the growing evidence related to the information-seeking behavior of farmers and their willingness to respond to economic incentives.

A study group in the Near East interviewed 482 farmers in three countries to determine why they did not adopt farm practices more rapidly. When asked if they wanted to produce more from the land they presently cultivated, 99 percent answered strongly in the affirmative, "frequently with the nod of the head and a look that indicated that it was a foolish question in the first place." Almost without exception, each farmer could tell what he did, when he did it, how he did it, and why he did it. The study group concluded that the reasons the farmers gave for adopting or not adopting a practice made considerable sense according to their own criteria.

Myren argues that Latin American farmers do search for information: "Even those on small peasant holdings appear to have a considerable desire to produce more efficiently and are interested in information on how this can be done." He states the case as follows:

What, then, would adequate information for a farmer about a new practice consist of? First of all, the idea must appear to be credible—it must make sense when considered in the light of his past experience. That is, it must not sound illogical or impossible. But much more than that, the source of the new information must be considered trustworthy by the farmer, and this judgment will be based again largely on his past experience and the observations of people whom he trusts—these may be neighbors, extension agents or even farm magazines which have developed a reputation for honesty and trustworthiness.

Studying the Abakaliki rice farmers in Eastern Nigeria, Welsch found considerable response to economic incentives. He points out that, unfortunately, those charged with allocation of resources for agricultural development, the administrators of extension services, and extension workers are trained primarily in technical agriculture and have had little exposure to the literature of economics. Therefore, "because it seems to be an easier explanation of poverty and lack of development, they have eagerly adopted the idea that peasant farmers are not rational economic men." Thus our perceptions lead to a faulty definition of a situation.

On the other side of the world, Malone found that farmers in the Tanjore district of India responded favorably to economic incentives. "This indicates that much more of a mass development of agriculture is possible, at least under Tanjore conditions, than generally has been conceived."

What would happen if we were to assume that the majority of the farmers are motivated to improve their own welfare by increasing production?

Myren answers the question directly and concisely:

If such motivation exists, progress can best be achieved by assisting the farmer in his search for information and in obtaining credit to purchase the inputs that already embody new technology...

In such a scheme the farmer is the central figure; sources of information, including the extension agent, must be studied in their function of reducing the cost (economic and psychological) of this search for new ideas and new practices. Within this scheme, an extension agent must be concerned with limiting factors... He must search for information, search for materials, and find ways to provide access to them.

Why Farmers May Resist Change

At the risk of oversimplifying the issues, it seems reasonable to group the reasons why a farmer may not adopt a practice into these major categories:

1. He just does not have a need for the practice. We must accept the possibility that there are persons who are "rational non-adopters."
2. He is willing, but supplies or other resources he is able to pay for and use actually are not available or obtainable.

3. He is willing but encounters barriers beyond his capacity to overcome. These might include: (a) failure of the agency to teach him the critical steps; (b) failure of the agency to enlist the necessary support of other key people, such as landlords; (c) failure to establish convenient means of obtaining credit and other services; and (d) failure of nature to cooperate—for instance, when the rains stop, he cannot apply a systemic insecticide in water that does not exist.

4. He lacks confidence in the idea and/or the agency or personnel identified with it. In some cases, his skepticism may be justified.

5. He sees the risks involved as likely to be greater than the promised returns.

At least three of these categories deal with factors intimately associated with the people and organizations which exist to promote change and serve the farmer. The farmer rarely can do anything about these.

Organization Factors Associated with "Resistance"

Individuals and organizations engage in technical assistance in many ways. Those who work with or in government agencies often view these as being unwieldy and slow to change. They sometimes cite such symptoms as these:

Inter-agency rivalries and competition, as evidenced by an unwillingness to communicate and cooperate at national levels or in the field. Similar rivalries may lead agencies to fail to accept or use each others' research findings, whether these be about farm problems or about the farmer.

Distorted emphasis upon emergency or crash programs, upon paper performance rather than field results, and upon nationwide uniformity in the recommendations of any given agency. This leads to promotion rather than education. The farmer is told he ought to grow more rice but he is not instructed in how or provided with necessary resources. He receives generalized recommendations about fertilizer rates, insect control measures, and seed varieties without regard to such equally important variables as season, soil type, and local insect conditions.

This situation illustrates what Dandekar describes as the difference between tradition and science:

Traditional knowledge is authoritarian, science is experimental. Government officials and official agencies are apt to overlook this difference because within the official hierarchy, knowledge and all

that passes under that name, moves from the secretary to the deputy secretary or from the director to the deputy director, down to the last official at the village level, all along fully protected and secured with the sanction of authority. . . . What is required. . . . is some arrangement by means of which at least a small number of progressive and intelligent farmers in each district or smaller area may participate actively in the research experimentation, and a forum where they may regularly report the findings of their experimentation in a scientific manner.

Further, the prevailing concepts of management and training may not be adequate. In situations where a great deal of technical competence and experience is needed at the farm level, typical train-the-trainer approaches may not filter enough reliable, useful information and skills down to the lowest level where they are needed if the extension worker is to perform and the farmer learn how to do things differently. Preoccupations with creating "bigger and better" extension systems can obscure the fact that there may not be an adequate amount of reliable information to communicate through the system.

Finally, research and extension organizations may set their sights too low, being willing to accept minor gains over typical farm yields. Experiment station and field trials of new varieties or practices frequently show only slight increases over the farmers' averages and probably less than what the good farmer already gets.

These observations and this line of thought lead to the proposition that the change systems and their representatives frequently generate much of the resistance they encounter.

- They tell people what to do rather than ask them what and why they do what they do.
- They preach practices rather than teach farmers how and why.
- In training efforts, they stress extension methods rather than technical competence.
- They talk about rather than demonstrate practices.
- They send inadequately prepared people to teach farmers.
- They fail to discriminate among those workers who are technically adequate and those who are not.

To the extent that change agencies maintain these orientations and continue these practices, we can expect resistances to continue and perhaps to mount. Those who seek changes on the farm must first concentrate on assessing and changing, where necessary, the operations and orientations of bureaucracy. Part of the answer lies in modifying the perceptions bureaucrats have about the behavior of farmers.

Problems of Staffing and Management

Some of the "growing pains" of development are the difficult problems national agencies have recruiting, training, and managing a field staff of change agents. Frequently, there are not enough well-trained persons to fill all the jobs. Even those who are available usually lack the rural background which would make them most immediately useful.

Wharton notes that in underdeveloped countries where there is a pressure for expansion of entering classes in higher education, these pressures coupled with other factors have resulted in the lowering of standards to the point that the quality of the final products tends to deteriorate. He also indicates that many disciplines most important for the problems of the underdeveloped countries, particularly the agricultural sciences, have the lowest prestige and attract the poor students. "The result is the poorest talent devoted to the most critical problem, affecting 75 to 80 percent of the population."

Implications for Future Action

The purpose of the foregoing data and observations, while sketchy and thus inconclusive, is to stimulate the development of some new approaches to the study of diffusion, to the pre- and in-service training of persons to work as change agents in agriculture, and to the administration and evaluation of programs to introduce change in rural areas.

Future inquiries into diffusion processes may be more illuminating if technical adequacy of the change agent and technical appropriateness of the innovation are considered. This suggestion recognizes the difficulties involved and perhaps illustrates the need to develop reliable, valid measures of adequacy and appropriateness.

Problems of personnel inadequacy and of performance at the local level suggest that educational institutions and change agencies must jointly explore the processes by which they recruit students and staff, as well as carefully appraise the content, methods, and behavioral objectives needed in pre- and in-service education.

Finally, the administrators of change organizations might productively inquire to what extent the organization, staffing, operation, and inter-agency competition of the agencies constitute obstacles to change and develop resistance among farmers.

[Excerpted from "Some Missing Variables in Diffusion Research and Innovation Strategy," A/D/C Reprint Series. New York: The Agricultural Development Council, Inc., March 1968, pp. 1-11.]

BOOK REVIEWS

Ruthenberg, Hans (ed.), Smallholder Farming and Smallholder Development in Tanzania: Ten Case Studies. Munich: Weltforum Verlag, 1968, 355 pp.

This volume is a splendid combination of careful empirical research, in its ten case studies, with a valuable analysis of what can and cannot be inferred from the materials collected. Quite a lot can be so inferred, and this review will deal largely with Dr. Ruthenberg's concluding analytical summary. A great deal of the strength of this analysis, however, derives from its foundations in the case studies, whose authors deserve more credit than they can be given here. Ruthenberg's general points are made with frequent references to particular areas or tribal groups studied. Dr. Ruthenberg is Director of the Institut für Ausländische Landwirtschaft (Foreign Agriculture), Stuttgart, and editor of the Africa-Study Series of the IFO-Institut für Wirtschaftsforschung (Economic Research), Munich, West Germany.

While there is considerable diversity in the conditions and methods of smallholder farming in various parts of Tanzania, and a rather pervasive pressure for change underway in most areas, there are some common denominators. All groups are found to be ingenious in adapting their choices of crops to the particular natural conditions encountered. Land use is not haphazard, nor is it a mere repetition of traditional practices. The mixtures of crops planted as soil types vary; the differentiation of planting times to stagger the work or the harvest, and/or adapt to rainfall; the combinations of trees and plants responsive to soil and labor limitations—these practices give evidence of rationality and "hidden order" in the seeming chaos of no straight lines nor regular distances in the planting.

At the same time there is a generally though not consistently low level of skill and application in husbandry practices. The differences between groups are very great, and do not follow logical patterns. The weaknesses show up in such activities as weeding, mulching, spacing plants, choosing numbers of seeds per hole, completing the planting on time for the season; cutting down obsolescent fruit trees, pruning trees; maintaining cattle health and organizing grazing areas. Some groups are good at one or a few practices; a limited number of superior farmers stand out in any group; but the general standard is low, and even practices with which farmers are well acquainted are erratically followed.

The farmers give a variety of reasons for what they themselves see as shortcomings—poor soil, other demands on time, etc. Ruthenberg finds many of these reasons unconvincing, though some are valid and others may be sincerely believed. His basic explanation is that the smallholding farmers of today are, with varying distances in time, descendants of the shifting cultivators of an earlier period of sparse population and ample land. Their adaptability to changes in soil, weather, etc., is an older "tradition" with them than the care for any particular location where they may find themselves. Groups which have been settled longer, and especially those which have experienced land shortage for some time, are developing more skill in husbandry. Also, better care is given to valuable cash crops than to subsistence food crops.

Similarly, widespread deficiencies in labor efficiency are noted, whether by comparison with standards elsewhere or with standards demonstrated by the best Tanzanian farmers. Here also, the background of shifting cultivators and roving herdsmen, making their living with relatively infrequent exertions, offers a more basic explanation than the reasons given by farmers. Over time the trend has been toward longer and harder working days, and toward a greater feeling of pride in work and its results. The current practices vary a good deal: underemployment is lower where commercial crops are more prominent and incomes are higher (contrary to the backward bending supply curve!). Underemployment also falls as land becomes scarcer, and requires more attention per family plot.

The effects of population pressure relative to land are constructive up to a point; farmers work harder, choose more rewarding crops, take better care of their assets. Such trends, plus the continued expansion of cultivated land where possible, indicate a currently rapid growth of agricultural production in Tanzania. But in some areas where population pressures have gone beyond the usual ratio, a further stage of "involution" can be observed: cash crops give way to subsistence food growing, with more cassava at the

expense of maize and millet; underfed cattle, overgrazing crowded areas, bring on erosion. Ruthenberg concludes that with population growing as fast as it is there is a real danger of stagnation or decline in agricultural incomes if only the methods now known to most farmers are applied to their situations. He seems to imply that continuing economic growth will require extensive technical change, starting well before the involutory conditions become dominant.

One may conclude from this analysis that the possibilities for technical change in Tanzanian smallholder agriculture are not unfavorable, but that purposeful policies will be needed. For one thing, economic motivations can be counted on in the farmers, among whom an increased acquaintance with commercial crops and with the cash earnings they bring in seems to augment commercial attitudes toward farming. All types of farmers appear reasonably responsive to economic incentives provided these are large enough to be interesting—although there appears to be a fairly high threshold in this respect. Secondly, the small farmers have shown themselves "remarkably open to innovations, particularly new crops and new means of production, when it is demonstrated that these are to their advantage. They are rather poor innovators, however, when left on their own." Experience shows that technical progress is most likely when the smallholders are "... continuously confronted with innovations which have already proved successful on large farms, and with systems of inducement [economic] and selective pressures exerted by agricultural officers."

Ruthenberg goes on to spell out a rationale for development policy in agriculture under the conditions described. Its highlights are:

1. Innovations in cash crops are more readily accepted than in subsistence food crops, partly because the men who work on the former are less conservative than the women who tend the latter; also, because increased food, unlike cash, must often be shared with relatives. Taxes to support an increased extension service can be raised from increased cash crops. Innovations in plants are easier to initiate than those affecting cattle, partly because the former are more easily undertaken by individuals acting alone.

2. Wholly new crops and methods, even though they involve large changes in habits and skills, arouse more support than subsidiary changes or improvements in existing activities. Conspicuousness is appealing, especially when highly profitable, whereas improvements which give slow but cumulative results are not as interesting. As a corollary, a bundle of associated innovations—e.g., new crops, terracing, fertilizer, equidistant planting, etc.—may be better introduced all at once rather than one at a time.

3. Official pressures can be effective for innovation, Ruthenberg argues, but only if intelligently planned and pinpointed, and applied to worthwhile innovations, with steadiness and consistency, and in ways appropriate to local cultural traditions. Arbitrary, erratic, or vaguely defined pressures can be harmful.

4. Price policies associated with the introduction of innovations should ensure that the profitability of adoption will exceed a threshold value needed to induce acceptance, the "critical minimum benefit." Ruthenberg sees economic incentives as most effective when part of a wider campaign to bring about the cultural changes associated with technology; presumably such incentives do not work automatically toward predetermined results.

Development and Change in Traditional Agriculture: Focus on South Asia.

Papers from a symposium held in East Lansing, Michigan, Summer of 1968. Published by the Asian Studies Center, Michigan State University, East Lansing, November 1968.

This symposium focussed on the aftermath of the increased grain production of recent years in India and Pakistan, the problems consequent on the increases in output, and the neglected areas not benefiting from the new technology. While many other matters of policy, research concepts, etc., were dealt with by the contributors, this review will touch on only a few related to the above. Papers were presented by T. W. Schultz, University of Chicago; Edward S. Mason, Harvard; Willard W. Cochrane, University of Minnesota; Ralph W. Cummings, Rockefeller Foundation; Joseph W. Elder, University of Wisconsin; and Mrs. Kusum Nair, Michigan State.

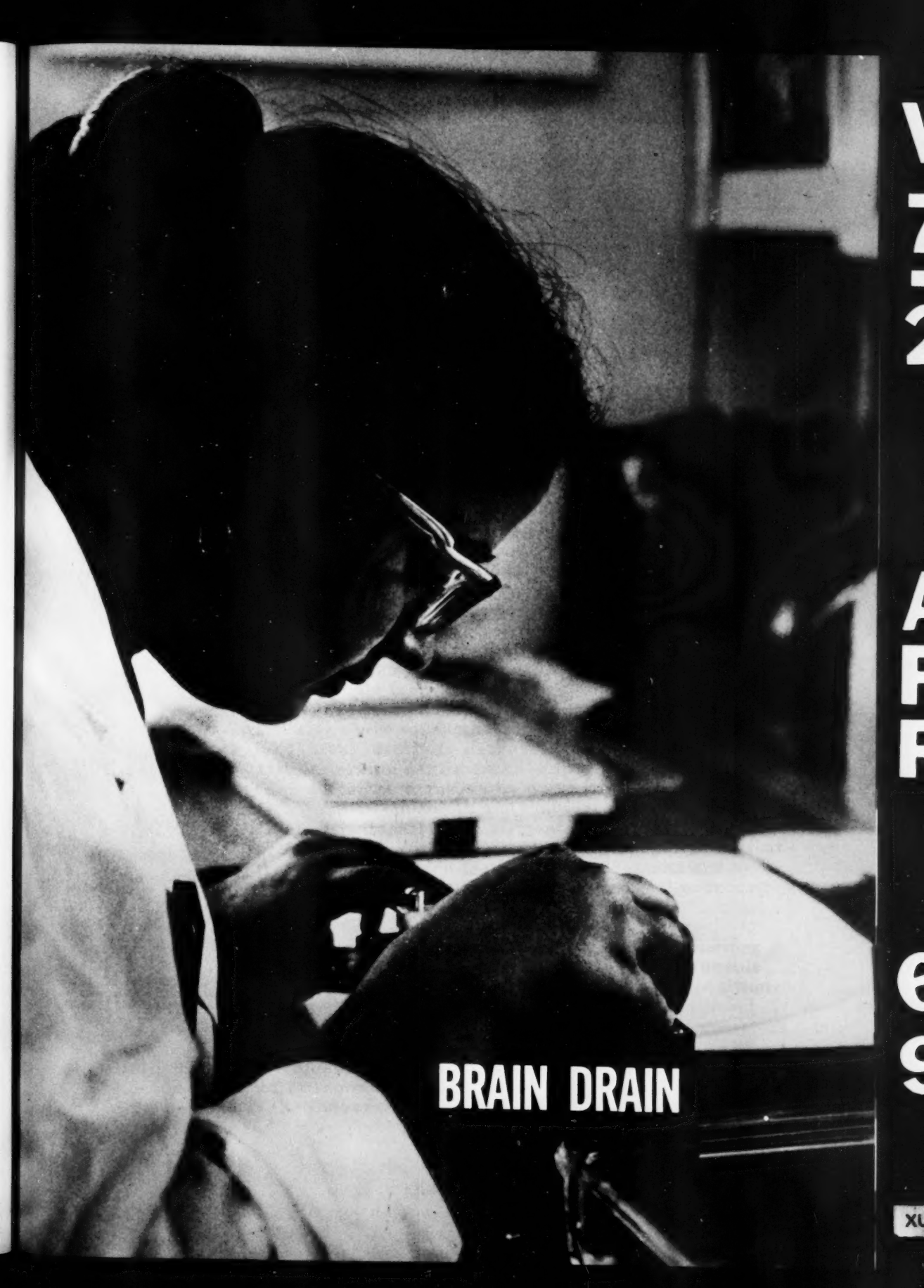
All participants agreed that the pace of change in Asian agriculture has been rapid in recent years. Shortages in storage capacity are showing up, along with the need for much greater marketing capabilities; price and incentive problems for continuity of progress are raised by recent successes. Cummings warned that the increases in production were likely to taper off at a new plateau in the absence of new technological breakthroughs comparable to the recent ones. His remedy was the development of a strong, production-oriented research apparatus in India and elsewhere, and for diffusion a "change in the change agents." Instead of a single multipurpose extension worker for a given area, he suggested that a team of specialists might better understand and demonstrate improvements.

Cochrane noted that middle and large farmers in India had seized upon the new technology, that in village after village they were fighting one another and the government agents with a quasi religious fanaticism to get the latest type of grain. But the small farmers have been bypassed. They lack financial and managerial capabilities and their farms are too small for economic use of such modern units as tractors, threshing machines, or tube wells. To correct this condition, central and state governments must: help the farmers achieve managerial capacity, mainly through education; resolve problems of resource scale through formal or informal cooperative action; and make resources available for loans to small farmers.

Schultz questioned whether it will be possible to avoid creating depressed areas—Appalachias—within India. Currently the comparative advantage in agriculture has been shifting, as a result of modernization, to the northern plains and the major "rice bowls" of the south, leaving a large triangle in central India behind.

Mrs. Nair followed up Cochrane's concern over the alliance of new technology with the richer farmers, and the widening gap between them and the small farmers. She estimated that over 60 million families will have to remain in agriculture for years (48 million are now on farms less than 5 acres and landless) since urban jobs will at best expand slower than the total working population. The key problem then is how to modernize the small farmer. Despite the overwhelming difficulties, she felt that this can be done if the objective is pursued energetically and intelligently. She considered that the American experience offers little guide to India in this problem, not merely because of the vast difference in per capita land and resources but because large units with modern inputs have driven the small U. S. farmers out of agriculture, and created Appalachias for those who remain; this last is not inevitable in India. However, the experiences with modernizing large numbers of small farm units in Japan and Taiwan should be a valuable "how to do it" guide for India.

The symposium discussions were a useful exploration of the meaning of agricultural change for policy, planning, investment, and research with special application to India and Pakistan. Readers from other areas will find it challenging to attempt an equally farsighted evaluation of their own related problems.



BRAIN DRAIN

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DR. BHARGAVA OF INDIA IS AT WORK IN THE SALK INSTITUTE
OF BIOLOGICAL STUDIES, LA JOLLA, CALIFORNIA, WHERE
RESEARCHERS FROM TWELVE NATIONS ARE STUDYING
THE PROCESSES OF LIFE.
(PHOTO: SALK INSTITUTE)

ECONOMIC ASPECTS OF BRAIN DRAIN

Harry G. Johnson

[The harmful effects of "brain drain" are usually exaggerated, and the benefits of migration ignored, by overly nationalistic approaches. In economic terms, migration of the educated is likely to produce world gains, while losses to particular countries could be covered by compensation arrangements.]

The "brain drain" idea had its origins in a nationalistic concept: that economic and cultural welfare exists in terms of a national state viewed as a totality, and not in a consideration of the welfare of people born in that region who choose to leave it, nor the welfare of the outside world in general. Moreover, though the statistics are far from adequate, there is assumed to be a net flow of trained professional people from the former colonial territories to the ex-imperial European nations, and from Europe and elsewhere to North America. The concept thus lends itself easily to expression of anti-colonial and anti-American sentiments. Expression of these sentiments can be dignified by presenting the brain drain as a serious economic and cultural problem, by relying on nationalistic sentiments, and by ignoring the principles of economics—especially the principle that in every transaction there is both a demand and a supply—or by elevating certain theoretical economic possibilities into presumed hard facts.

Before discussing the "brain drain" and whether it constitutes a problem, therefore, one must decide whether or not one accepts the nationalistic position. I personally do not; I adopt a cosmopolitan liberal

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position. Consequently, I start with the assumption that international circulation of human capital is a beneficial process, reflecting free choices of the individuals concerned. Any argument to the contrary needs very careful scrutiny and documentation before it can be accepted. This is especially so because feelings of national identity among potential migrants themselves create fairly strong artificial barriers to migration, so that less migration from low income to high income regions occurs than would be economically optimal. What migration does occur probably involves substantial gains in world efficiency.

Cultural and Economic Determinants of Migration Circuits

At the outset, let me warn against two sources of optical illusion in evaluating the magnitude of international human capital flows. In both cases, the danger of optical illusion is fostered by statistical deficiencies and by anachronistic concepts of the training and functioning of skilled people. First, the education of a professional person in modern times—just like the education of a scholar in medieval times—frequently entails prolonged study abroad, either formally in graduate school or informally in on-the-job training. Such training is not permanent emigration, but is frequently treated as such both statistically and in political discussion. Second, the trained professional man nowadays typically travels, and is prepared to travel, a great deal in the exercise of his profession. Thus nationality or country of domicile of such individuals is not a reliable indicator of where they do their work. In particular, people who have emigrated may nevertheless perform their professional services to a significant extent in their countries of origin; moreover, hiring their services (or those of other non-nationals) when needed may be more efficient for these countries than attempting to maintain a national stock of all the skills that might be needed from time to time.

Turning to what may be termed "permanent" flows of human capital, one finds certain fairly well demarcated patterns. One such is the flow from ex-colonial territories to their ex-imperial centers, most marked in the case of France and the United Kingdom. The colonial-imperial link means that the cultural barriers are lower than to other types of migration.

Another pattern is that of general movement through intermediate stages from lower-income to higher-income countries, of which the outstanding features are the position of the United Kingdom as a country of large-scale immigration from the Commonwealth and emigration to the United States and the richer Commonwealth countries, and of Canada as a country of large-scale immigration from Europe and emigration to the United States. Migration by stages reflects the

migrant's limitations for cultural and economic integration into a higher-level society, and also discrimination in favor of skilled migrants. It implies a flow mechanism operating in an imperfectly integrated market through a chain of substitutions between groups of people of different "qualities" in terms of educational qualifications and cultural mobility.

This process does not operate in the same way for all types of professional people, nor is migration of skilled people entirely motivated by economic considerations. This point is important in deciding whether international migration of professional people is a problem, even from the nationalistic point of view.

First, much emigration is attributable to political reasons: aversion to the prevailing political instability, or fear of personal victimization. It is fatuous in the extreme for sympathizers with the poor nations to lament as a "brain drain" harmful to their economic development the exodus of political refugees who happen to have the educational qualifications necessary to escape.

Second, higher educational systems of some countries produce a supply of certain kinds of educated people larger than their economic systems can absorb; in these cases emigration provides a natural safety-valve rather than a "brain drain." Producing educated people for export may or may not involve inefficiency from a cosmopolitan point of view: a country may have a comparative advantage in skill production. From a nationalistic point of view the emigration may be considered a loss, though certain forms of nationalism would prefer emigration to restricting the country's educational facilities to what the country itself could absorb.

Third, the dominating factors in the international migration of different types of professional talent may well be different. In the case of the international migration of medical doctors—traditionally very much a private enterprise profession—important factors have been the successful monopolistic practice of the American Medical Association in restricting the supply of American-trained doctors and raising doctors' fees, thereby attracting immigrants; and the efforts of the British government to hold down salaries of National Health Service doctors, thus giving incentives to emigrate. In certain "big" sciences research equipment is so costly that only a few countries can afford it; people in other countries interested in these kinds of research have to migrate, at least temporarily. In other scientific subjects, the superiority of a few research teams at a particular location ("centers of excellence") may have the same effect. Similar factors operating through the economies of scale and of specialization and division of labor made possible by corporate enterprise operating in a large national or international market influence the international migration of engineers and scientists.

It is important to recognize the influence of scale and specialization, and more generally, the complementarities between knowledge and skill and the other inputs into research or production on incentives to migrate. Otherwise it is easy to assume, wrongly, that the migrant would have made the same contribution to research or national income in the country from which he emigrates as he makes in the country to which he migrates, i.e., to assume that all of these complementary inputs are equally available in the country of emigration.

Two other factors deserve mention. They are special to this historical period and may prove to be transitory in the longer run.

1) The massive support of research and development expenditure by the United States government, and in particular, the "space race," is attracting an inflow of scientists and engineers. This factor raises some fundamental philosophical questions about how far, if at all, expenditures on armaments can be regarded as a contribution to world output and economic welfare. 2) The rapid postwar expansion of demand for university education, both at the undergraduate and the graduate level, has created an increase in demand for university teachers. This has been satisfied to a significant extent by international migration of qualified people via the intermediary-stages process. This demand is likely to be abated as current trainees find their way into the market for talented labor.

Economic Aspects of "Brain Drain"

From the cosmopolitan liberal point of view, international migration of educated people is presumed to be a beneficial process, since it results from the free choices of individuals, unless for some reason private benefits from migration are obtained at a social cost. Two questions may be posed: in what circumstances is this migration likely to entail an economic loss to the world as a whole? In what circumstances is it likely to impose an uncompensated loss on the remaining residents of the countries of emigration? In both cases it is useful to distinguish between developed and underdeveloped countries, and to pay special attention to the latter, though the main lines of the argument are the same for both.

Normally, international migration of educated people—like any profit-motivated international movement of factors of production—may be expected to raise total world output. Migration may also be said to increase potential world welfare, in the sense that the gainers from such migration, normally assumed to be the migrant himself and the public of the country of immigration, could compensate the losers, normally assumed to be the public of the country of emigration, and still have something left over. Some elements of compensatory mechanisms exist in the world as it is. Direct elements

of compensation exist in the form of private financial remittances by emigrants to their countries of origin. Indirect elements are found in the provision of education at the expense of countries of immigration to citizens of countries of emigration who return home, and in the provision to the less developed of those countries of the trained experts of the developed countries as part of their foreign aid programs. But there is no articulated machinery for compensation. Hence, it becomes important to determine what, if any, elements of loss there may be and what sort of compensation might be necessary.

As for possible economic loss to the world as a whole, such loss requires that the migrant move from a location where his total contribution to social output is higher to one where it will be lower. This will be true only if the relationship between the private incomes available in the countries of emigration and immigration is inverse to the relationship between the alternative contributions to social output in the two locations. This may exist when the activity of the educated person involves what technical economic theory terms an "externality"—that is, he contributes something to the welfare or productivity of others in the country of his residence over and above what the individual is paid for doing. Moreover, this must be something peculiar to him personally and not to his professional capacity—and that externality is greater in his country of birth than in his country of immigration. Such externalities may include leadership capacity, originality of thought, and inventive ability. It is necessary to note that many such apparent "externalities" are in fact rewarded through the market.

Some Subjective Factors Affecting Migration

The economic analysis assumes that educated migrants are motivated by strictly private economic considerations. But people are not strictly economic in making choices of this kind, and their departures from economic rationality tend to weaken still further the probability of world economic loss from the international migration of skilled people. First, potential migrants generally have a preference for their country of birth which constitutes an artificial barrier to efficient allocation of their talents among countries. Second, people frequently tend to regard the public finance systems of their country of origin as socially just, whereas they are not generally either familiar with the government services provided in other countries or convinced of the justice of their tax systems. They are therefore likely to compare their gross incomes in their countries of origin with their disposable incomes after taxes in their countries of immigration, implying that what migration occurs is likely to produce substantial increases in social output. Third, the educated person is generally aware of the externalities he engenders for

others; thus what may appear to the theorist to be externalities may in fact be internalized in individual satisfaction. Further, the educated person is likely to exaggerate and overvalue the externalities he renders in his country of origin, and to disregard or undervalue the externalities he might render in his country of immigration.

This analysis indicates that migration of educated people among advanced countries is unlikely to produce world losses. On the contrary, it is likely to produce increased world economic welfare. Does the same analysis apply without qualification to emigration of educated people from less-developed countries, or is there a substantially strong possibility of world loss in that case?

In one important respect, the probable world gain from migration is much stronger in this case, owing to the great size of the income differential between developed and less-developed countries. This differential is large enough to make it virtually impossible for such migration to result in a world loss as a result of the inversion of relative social and private contributions in the alternative locations by relatively more progressive fiscal systems in the less-developed countries, or by the exercise in those countries of more stringent policies of holding down professional incomes for the benefit of the poorer classes of society. (In fact, it is likely on the average that the more progressive fiscal structures and income policies are to be found in the developed countries, with the result that the gain in world social product from this type of migration will exceed rather than fall short of the gain in private income.)

Any possibility of world loss must therefore hinge on a loss of externalities to the country of emigration, unmatched by an offsetting gain of externalities to the country of immigration, and quantitatively large enough to outweigh the private income gains to the migrants. Various theoretical possibilities of such loss of externalities may be envisaged, but all of these possibilities raise both the qualitative question of whether the externalities posited correspond to the facts of the situation, and the quantitative question of whether their effects are important enough to countervail against the presumption of a world gain. In the absence of any very persuasive evidence to the contrary, it seems reasonable to conclude that there is no significant probability of world loss from international migration of educated people.

Another question, however, is whether such migration may entail uncompensated losses to the countries of emigration. To begin with, it should be noted that the country of emigration generally obtains some gain from the emigration of educated people, which may provide indirect compensation for any losses incurred. Aside from emigrant remittances, the country will obtain the benefit of basic

scientific discoveries made by emigrants; it may also benefit by the availability of better-quality or lower-cost products, produced with the help of the services of the emigrants; and even where it has to pay royalties and license fees to use the product of their research, it may be better off than if it had had to finance the research itself.

Residents of the country of emigration obviously lose from emigration to the extent that emigration deprives the nation of tax revenue in excess of the cost of governmental services that would have had to be provided to the emigrants. There are two major cases. 1) Assuming that the emigrant is typically in a higher income-tax bracket than the average of the population, he deprives those who remain behind of their tax-mediated share in his income. 2) To the extent that the currently working generation pays the costs of education of the young through its taxes, and in return expects to be supported in its old age by pensions financed by taxes on the incomes of the presently young after they have graduated into the currently working category, emigration of the young after completion of education deprives their elders of their expected retirement benefits. Precisely the same two cases arise when the incomes the migrants would have earned are reduced by deliberate government policy.

The transfer of taxable capacity from the country of emigration to the country of immigration when the emigrant changes countries has been described in the literature as a gift from one country to the other. This notion of a "gift," however, is ambiguous. It makes an important difference to the policy implications of international migration whether such people are provided with publicly financed education in the expectation that they will remain at home and compensate (or overcompensate) those who have financed their education by paying taxes on the incomes they will subsequently earn; or whether the education is provided as a genuine gift intended to give them a better start in life, regardless of where they subsequently choose to live. Thus it is important to ascertain whether or not there is a loss from the emigration of educated people to determine what the assumptions of public education policy are.

So far, this discussion of possible losses to the country of emigration has been both quite general and rather skeptical about the likelihood of significant losses. There is, on the contrary, a tendency for those who sympathize with the underdeveloped countries to assume the emigration of their educated people must impose great losses on them. Usually, this derives from a logical fallacy based on telescoping the nature and results of the development process. When these countries become fully developed, they will be able to employ larger numbers of educated people; but this does not imply that at present additional educated people would necessarily contribute significantly to their development. Development is an integrated

process, both of accumulating capital in the broad sense—material, human, and intellectual—and of evolving a culture that promotes the efficient use of this capital. It is not likely to be promoted by concentrating attention and economic policy on the accumulation of one type of capital while assuming that all else will follow. This has been shown by the unsatisfactory results of past development efforts concentrated on accumulation of material capital. It would be unfortunate if development theory were to resurrect the myth that there is a simple and quick road to development by simply substituting human capital for material capital as the crucial element.

Implications for Migration Policy

The policy problem is how to compensate countries that lose from emigration for the losses they incur. Institutional arrangements for such compensation would automatically prevent flows that entail a loss of world economic welfare, since the gainers would not be able to compensate the losers without ending up worse off.

Of the cases of loss, that associated with the "gift" element of taxable capacity is the most easily disposed of in principle. All that is required is an arrangement by which either the individual (whose education is publicly financed on the assumption that he will remain at home) or his employer, or the government in his country of immigration, is obliged to repay the cost of his education; or perhaps to repay that cost plus the amount of the projected future taxes on his income if he had remained in his own country.

1. This obligation might be imposed on students by their home government. In this case a more efficient and acceptable solution might be to finance student education, at least at the university level, by loans rather than grants. An alternative solution, which has already been applied to some extent is to require the publicly financed student to remain in or return to his country for a specified number of years. This is a less efficient alternative, since it deprives the educated individual of the freedom to decide whether personal service or cash repayment is a preferable alternative, and also fails to recognize the foregone-earnings element in the cost of education which is bound to differ among individuals.

2. The other possibility would be for the employer or the government in the country of immigration to pay a bounty to the country of emigration per immigrant received. This also would be an inefficient solution, owing to the difficulty of fixing a bounty that would correspond either to the loss of the country of emigration or the gain to the country of immigration; but it might be less open to evasion than an obligation imposed on the migrant by his own government.

The remaining possibilities of loss to the country of emigration are much more difficult to prescribe for, owing to the difficulty of estimating the magnitude of potential losses. Where there are clear cases of loss, there might be a basis for countries of emigration to develop policies to subsidize their resident educated personnel. But there would seem no reason why countries of immigration should pay a subsidy to the countries of emigration in return for the privileges of offering educated migrants an opportunity to escape from a situation in which their incomes fall short of their true social value.

This last proposition, however, ignores one important element in the present structure of the world economy: the discrimination against international migration of unskilled labor. If educated people can migrate but uneducated people cannot, the justice of advising countries with predominantly unskilled labor to pay the price of keeping their skilled labor at home is open to serious question. On the other hand, given the present lack of effective population control in the less-developed countries, it is doubtful whether relaxing prevailing barriers to immigration of unskilled labor would do anything in the long run to improve the lot of unskilled labor in the less-developed countries.

The alternative to compensation to the less-developed countries for losses entailed in the emigration of educated labor is an embargo on the international migration of this labor. This is very much an inferior alternative. It would deprive educated citizens of the less-developed countries of the opportunity to better their economic lot by emigration, and might induce these people to refuse to render the externalities that constitute the main argument for depriving them of their freedom to migrate. In addition, it would be difficult to devise an embargo that would prevent emigration while preserving the benefits of foreign study and work experience.

Broader Dynamic Considerations

In the broader perspective of economic evolution, the phenomena underlying current worries about "brain drain" are simply one aspect of a far more pervasive trend towards closer integration of the world economy. Other aspects are the reduction of barriers to international trade, increasing integration of national capital markets of the advanced countries, growth of direct investment by large international corporations, rapid spread of modern technology, and modernization of traditional class- and status-oriented societies into less personal, more mobile, and more flexible modes of interpersonal relationship. Many manifestations of this trend are bound to be distasteful to traditionalists and to nationalists. Nevertheless, the trend towards closer world economic integration is a powerful force operating to raise world living standards by disseminating

techniques, practices, and products that increase human productivity and satisfaction.

One important consequence is that the market for educated professional people, like the market for commodities, is becoming increasingly international. There is corresponding economic pressure towards equalization of prices for professional work throughout the international economy, manifest in the phenomena of "brain drain." These pressures imply a sharp increase in the scarcity value of educated people in most countries, sharper the lower the average level of income in the particular country. This in turn implies serious economic and social disturbance.

Rather than resist these pressures, "brain drain" policy in the countries affected should aim at adjusting the use of educated people to the new prevailing situation of increased relative scarcity, by recognizing the higher value of such people in contemporary circumstances, paying them accordingly, and seeking at the same time to economize on their use. Employers of educated people should abandon the notion of a "just price," conformable to past social relationships based on the dominance of property owners. The effect of competitive pressures will in any case inevitably be to force such adjustments; the question is only whether policy will be dictated by foresight or by hindsight.

In general the effects of these competitive pressures in the market for educated labor should be to promote economic growth. They should also, in the longer run, promote a more desirable society, by undermining the dominance of property ownership as a source of wealth and social status. These effects will prove beneficial in the developed and less-developed countries alike.

[Condensed from "An 'Internationalist' Model, " The Brain Drain, Walter Adams (ed.). New York: The Macmillan Company, 1968, chapter 5, pp. 69-91. Copyright © 1968 by Walter Adams. Reprinted with permission. This article or parts thereof may not be reproduced in any form without permission from the publisher.]

POLICIES AFFECTING THE OUTFLOW OF TRAINED PERSONNEL

United Nations Institute for Training
and Research (UNITAR) Staff

[Surveys of measures taken by developing countries relating to control of students studying abroad, and to their recruitment for employment at home, indicate that few countries are actively "stemming the brain drain." United States visa regulations for exchange visitors seem to have had some effect.]

Few developing countries have taken direct action on the question of the "brain drain," but countries have taken steps relating to study abroad or professional migration for a variety of reasons.

Some countries, including Colombia, Malta, the United Republic of Tanzania and Somalia have appointed committees to select recipients of government scholarships as well as those offered scholarships by foreign governments and private institutions. These countries attempt to select students on the basis of national need. Nations from which many students emigrate, however, appear to put comparatively few of those students through such selection procedures or otherwise try to coordinate education abroad with the national need.

Most countries control foreign exchange used by students and a few countries, like Tanzania, require the student to deposit a bond against his return or that his family agree to make payment if he fails to come back. Some countries limit the validity of their students' passports to short periods. Some demand an official record of grades before renewal is given. In a very few cases, embassies retain the student's passport until his departure. Others allow students to hold passports only for study in certain fields, usually technical and scientific. India no longer

permits the examination of the United States Educational Council for Foreign Medical Graduates to be given in India. (Passing this examination has been a requirement for admission to U. S. hospitals as internes or residents.) Passports are usually not granted to Indian students to study law abroad.

Only a handful of countries (five in all) make regular efforts to recruit their own students in the U. S. for home employment. Five others reported occasional recruitment. Two had regular and two occasional job-interview boards, 26 had none. The rest had no recruitment efforts. Five had special publications about employment opportunities, two occasionally sent such publications, 23 had none. A very small number of embassies maintain special student offices to keep students in touch with job opportunities; in the case of Thailand, this effort appears to have had good results. Iran, in addition to a quarterly newsletter, has offered students wishing to return home for the summer substantial air fare subsidy, and has moved toward leniency on its military service requirements. Kenya recruitment tours have encouraged 170 students to return. India mails its students a weekly listing of employment openings. Positive efforts of this character help to broaden contact with students abroad, many of whom feel isolated from their homeland.

The Colombian Institute for Advanced Training Abroad is an autonomous government agency, conducting studies to ascertain Colombian national priorities, and helps select overseas students most likely to serve Colombian needs. It also selects foreign scholarship recipients, provides loans and allocates foreign exchange for overseas study. Where it administers scholarship funds from other institutions, it requires that students helped by it should work two years in Colombia for every year spent in study abroad.

India maintains a Scientists Pool to support Indian scientists trained abroad while they are looking for jobs. [see pp. 69-73.] Korea is setting up an Institute for Science and Technology to provide research facilities in a well-equipped environment. As of May 1968, nearly 30 Korean scientists had agreed to return home to work at this Institute. These scientists are assured a salary of between \$300 and \$400 per month plus free housing, a salary scale about three to five times what government scientists presently earn. Argentina has relaxed import taxes and helped provide housing for returning professionals. Some Latin American countries are considering a requirement that foreign contractors engaged in large infra-structural projects be obliged to recruit professional and highly trained manpower from among citizens who have remained abroad. The terms of employment would be the same as those governing foreign employees. Pahlavi University in Iran emphasizes recruiting faculty members from among Iranians who received their

graduate degrees in the U.S. and remained there. [see pages 58-61.]

The United Nations International Centre for Theoretical Physics in Trieste helps in stemming the migration of high-ranking physicists from developing countries; it finances associateships giving a scientist from a developing country a three-year appointment to spend one to three months each year at the Trieste Center.

The Exchange-Visitor (J) visa of the U.S. is an attempt to encourage the foreign graduates to return. The purpose of a foreigner's visit is specified in terms of a strict program of two to five years. Upon completing his program, the foreigner must leave the country for at least two years before reapplying for admission in any other category. However, waivers of the departure requirement, which were 184 or less annually until 1965, mounted to 1,115 for "hardship" and 429 "granted at the request of other government agencies," during 1967. Frequently, also, instead of going home J-visa holders went to Canada, from which they gained permanent entry to the United States at a later date. Nevertheless, the vast majority of J-visa holders have returned to their countries, and the provisions have constituted considerable pressure for doing so.

[Excerpted from "Outflow of Trained Personnel from Developing Countries," a report submitted by the Secretary-General of the United Nations to the Twenty-third Session of the General Assembly, New York, 5 November 1968, UN Doc. No. A/7294, pp. 51-55.]

UNIVERSITIES COOPERATE TO STEM THE "BRAIN DRAIN"

W. A. Copeland

[The effort to create an American-style university in Iran, undertaken in a joint program with the University of Pennsylvania, has begun to attract Iranian graduates with American training back to their country.]

During the 1950s the Government of Iran embarked upon a vast expansion of its educational program, one facet of which involved sending many of its most promising university graduates to study in European and American institutions. In addition to this government program, a significant number of privately financed students also went abroad for study. Toward the end of the decade it appeared that many of these graduates, for various reasons, were not returning to Iran.

A most promising solution to this outflow of talent, it was thought, might rest in the establishment of an American-type university in Iran. This new university would have two primary goals: 1) to provide for those students who would otherwise seek their education abroad, and 2) to provide an opportunity which would attract back to Iran, as faculty members, those Iranians who had received their graduate degrees from American universities.

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In 1960, at the request of the Government of Iran and financed by the United States Agency for International Development (AID), a team from the University of Pennsylvania surveyed several institutions of higher education in Iran to determine which might best be transformed into an American-style university. The University of Shiraz, located 600 miles south of Tehran, was selected for this pilot project. Among the many reasons for recommending this institution was that an excellent medical complex was already in existence in Shiraz.

Pahlavi University is Created

In 1962 the Parliament of Iran passed a bill changing the University of Shiraz, previously under the control of the Ministry of Education, into Pahlavi University. Under the new law, the University became a private institution with its own Board of Trustees. The internal structure of the institution underwent a very drastic and significant change, transformed from the previous systems of faculties and chairs into colleges and departments. As might be anticipated, this change from one type of educational system to another was fraught with difficulties, particularly in view of the fact that there were essentially two groups of persons with very different types of training and educational background involved in the university. Many faculty members and administrators had obtained their education solely in Iran, with its French-type university system, and had no first-hand experience with or appreciation of the methods and objectives of an American-type education. On the other hand, a minority of faculty and staff members received their education in the United States and were, of course, familiar with the American system. To an extent, this dichotomy of two groups with opposing ideas concerning the function and administration of a modern university is still present in Shiraz.

A cooperative program between Pahlavi University and the University of Pennsylvania was made possible in 1962 through financing by AID. Advisory assistance initially was extended to the College of Medicine in Shiraz. With a revision of the AID contract in 1964, Pennsylvania was encouraged to transfer its primary attention to the College of Arts and Sciences with secondary attention to medicine and engineering.

Because of Iran's rapid economic progress, all AID assistance in that country, including the Pahlavi-Pennsylvania contract, was ended in 1967. However, in January 1967 a five-year direct contract was signed by the two universities. Under this contract, \$300,000 is provided annually by Pahlavi University to meet expenses incurred by the University of Pennsylvania for its services.

Recruiting to Stem the "Brain Drain"

The agreement is a far-ranging one, calling for the exchange of professors and students, the development of joint research proposals, reciprocal recognition of degrees, and the recruitment of Iranians in the United States for faculty positions at Pahlavi University. To date, faculty recruitment of Iranians has been the most successful long-range project undertaken.

In 1966, Pennsylvania was asked to recruit some 60 Iranians for faculty positions in Shiraz. Within two years over 250 applicants, most of whom have doctoral degrees, have been recruited as candidates for positions in the Colleges of Agriculture, Arts and Sciences, Engineering, and Medicine, representing between 10 and 20 percent of the total Iranian graduate student population in the United States. Of the 250 recruited, Pahlavi University has extended offers to approximately one-half, and many other applications are still under consideration.

The success achieved in this recruitment program has been made possible by the following: 1) Pahlavi University pays the highest salaries of any academic institution in Iran, with substantial fringe benefits, including liberal sabbatical leave policies. 2) The University of Pennsylvania made detailed information available to prospective candidates concerning Pahlavi University and its individual departments, for example, a list of journals to which the College libraries were subscribing, departmental curricula, salary scales, etc. 3) Pennsylvania obtained the names of all Iranian graduate students in the United States, with their addresses, fields of study, and dates of expected availability. 4) Initially, Iranian applicants from various parts of the United States were invited to Philadelphia for an intensive interview and orientation program. When they returned to their respective campuses, they spread information concerning Pahlavi University to other Iranians.

Retaining Faculty Members

Not only is it important to attract talented scholars to Pahlavi University, but it is equally important to retain their services in Shiraz for a long period of time. One of the ways in which this can be accomplished is by development of research. Members of the faculty in Shiraz have accordingly been encouraged to submit their research proposals for review by the appropriate departments at the University of Pennsylvania. Pennsylvania attempts to solicit funds from foundations and organizations in this country for proposals which are highly recommended and promising.

In the operational area in Shiraz, a number of Iranian staff members have been trained, and three have been sent to the United States under the auspices of the Pahlavi-Pennsylvania contract to study for degrees in library science. In addition, the University of Pennsylvania currently has three team members in Shiraz in library science.

In the area of physical development, \$175,000 worth of books and journals have been sent to the libraries of Pahlavi at a cost of less than \$20,000. These have been solicited as gifts and donations from faculty members and organizations in Philadelphia. In addition to this effort, the majority of assistance to the library program has come from the Iranian Oil Operating Companies (the Consortium) which made a grant of \$750,000 to Pahlavi University in 1964 for the purchase of books and journals for the library of the College of Arts and Sciences.

[Excerpted from "The Pahlavi-Pennsylvania Contract," International Development Review. Washington (D. C.): the Society for International Development, Vol. X, No. 3, September 1968, pp. 21-23.]

RESEARCH CENTERS IN DEVELOPING NATIONS

Carl Djerassi

[Can a basic research center of international standard be created in a country where no centers now exist and where scientists are scarce? The author thinks so, and points to an example in Mexico.]

Research scientists from a developing country who receive their advanced training abroad either find no opportunity to utilize their training when they return home, or encounter conditions which are so inferior to the ones to which they became accustomed while abroad that they are not prepared to accept them. The result: "brain drain"—either by emigration or by remaining at home but pursuing quite a different occupation. As far as research potential is concerned, changing fields is equivalent to brain drain by emigration, because with few exceptions a research scientist cannot be "put on ice" for a few years and then be expected to operate creatively.

The usual high-priority educational programs of developing countries—the improvement in indigenous primary, secondary, and lower university education—have one thing in common; they take many years before noticeable improvements can be achieved at the graduate levels. It follows then that even if the financial resources were available, the training of a pool of research scientists able to perform fundamental research would occur sometime in the very distant future. Without denying the importance of lower

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level education, I feel that it is indispensable that a parallel effort be made to establish centers for basic research of international excellence because:

1. By demonstrating in a few developing countries that internationally recognized basic research centers can be created without waiting for the "logical" educational and technological development of the country, an example is created which may prove useful in other developing areas.
2. By selecting a research field with ample opportunity for fundamental research and also practical possibilities for technological consequences, new industrial developments may be generated.
3. By selecting a research field with a maximum multiplication factor (for example chemical research which requires microbiological, entomological, and pharmacological evaluations, and leads to clinical and veterinary applications), a fairly rapid, yet logical broadening of the research effort can come about.
4. In countries where scientific research offers no status, a beginning will be made so that science will become a prestige career.
5. Advanced training in certain research fields can be provided without needing to send promising students abroad. Once they have been exposed to serious research in their own country, subsequent foreign training (even in another field) becomes more meaningful, and a return home much more likely since they will know that research of an international standard can be performed in their own research centers.
6. One factor that complicates the brain drain problem—unavailability of research facilities—will be partially eliminated.
7. To raise the overall scientific level of a country or even of one university is difficult and time-consuming. It is easier to create selected centers of excellence in a few fields and let their existence, in turn, be a stimulus in other areas. The local "image factor," though of limited value, should not be ignored. It is easier to point to an operating research effort (for example, the Rice Institute in the Philippines) than to a reduction in the illiteracy rate.

I would like to offer a concrete example from my own personal experience which has some bearing on the hypothetical case that I shall present later.

Case History: Mexico

My example is Mexico in 1949. Several universities existed in the country, notably the huge and venerable National University of Mexico. It had a faculty of chemistry, which graduated several hundred B.Sc. chemists each year. By American standards, the training and facilities ranged from mediocre to poor, but apparently they sufficed for the type of positions open to most graduates—analytical chemistry in industry, positions in small pharmaceutical laboratories, the nationalized petroleum industry, etc. No graduate training in the American sense of the word was available. Practically no basic chemical research was being performed and no fundamental chemical discoveries with a technological fall-out had been made in Mexico. On the other hand, enough technicians were available to adapt foreign technological developments, plastics manufacture being an example.

A few years earlier, Professor Russell E. Marker of Pennsylvania State College had found that certain Mexican plants contained substantial amounts of diosgenin, a substance that could be transformed into the female sex hormone progesterone. Marker's discovery led to the organization of a small Mexican company, Syntex, S.A. Largely through the efforts of a young European organic chemist, Dr. G. Rosenkranz, the manufacture of key steroid hormones was undertaken in Mexico with Mexican technicians using diosgenin as raw material. The methods used for the manufacture of these hormones were based on published procedures and did not involve fundamental new research, but rather adaptation of existing technology.

In 1949 the therapeutic effects of cortisone were discovered in the United States and received worldwide publicity. Academic as well as industrial research teams in Europe and the U.S. started to work feverishly on developing methods to synthesize this important hormone. In the same year, the hormone sales of Syntex had risen enough that it could afford its own research department. I joined the company as associate director of chemical research. Since steroid chemistry per se was not taught in Mexican universities, most of the Mexican technicians were trained on the premises, and a number of fellowships were established to enable Mexican university graduates to do their research in steroid chemistry in the Syntex Research Laboratories. As a matter of enlightened self-interest, the company subsidized the operation of the Institute of Chemistry of the National University so that in the early 1950s, the major portion of the operating budget of that Institute was based on annual donations from Syntex. As much of the advanced research had to be performed by Ph. D. level chemists, who essentially did not exist in Mexico, most of the research chemists were brought from abroad, and by 1959 Ph. D.

chemists from over a dozen different countries were working at Syntex. Scientific publication of research results in recognized international journals of the U. S. and Europe was encouraged—in fact so much so that by 1959, more scientific publications in steroid chemistry had emanated from Syntex in Mexico than from any other academic or industrial organization in the world. Some of the research results—for example, the first synthesis of cortisone from plant raw materials or the development of oral contraceptives—also gained general publicity. The important fact to consider is that in a matter of ten years, Mexico—a country where no basic chemical research had been performed previously—had become a world center in one specialized branch of chemistry. Other companies were also formed, and by 1960 well over 50 percent of the world's supply of steroid hormones originated from Mexico. Indirect benefits resulted: the Institute of Chemistry of the National University of Mexico, initially supported largely by Syntex and staffed almost exclusively by "graduates" of Syntex, received larger subsidies from government and philanthropic organizations and developed a Ph. D. program of its own.

The multiplication factor is demonstrated by the Mexican example. As a result of the ever-increasing demand for Mexican diosgenin, extensive botanical surveys of southern Mexico were undertaken. Several companies, including one from Germany, established botanical research stations in an effort to develop a new cultivatable crop. Finally, use of steroid hormones in animals to improve food utilization in cattle, synchronize estrus in sheep, and the like, has prompted a great deal of veterinary research all over the world and some of this is also being performed in Mexico.

Why did these developments happen in Mexico? It was a matter of proper timing, a domestic raw material, and some entrepreneurship. However, the plant material is also abundant in Central and South America, in South Africa, in India, and in China, and if the proper incentive and entrepreneurs had existed at that time in those countries, the same development could have occurred there instead.

This Mexican example illustrates the key component of my proposal about "who will do this research in the absence of the requisite trained manpower." The local supply of Ph. D. chemists in Mexico was negligible and virtually all of them had to be imported. Most of them were in their early twenties and had been trained in major American and European universities. Why were they prepared to move to Mexico? The salaries were just barely competitive with those paid in comparable American laboratories, but certainly not extraordinary. The physical laboratory conditions were good, but again not superior to the U. S. or Europe. To overcome the isolation inherent in working in locations distant from other active centers

of research, opportunities were offered to attend scientific meetings abroad. A few leading university professors from the U.S., England, and Israel served as consultants and visited the Mexican laboratory every three months. The excitement of doing research in a foreign country is of particular appeal to younger scientists and this is precisely the group that we wished to attract. Even the scientific publicity value—a scientific publication of good quality from a scientifically unknown country is noted by one's peers much more readily than one emanating from Harvard or Oxford—was a positive encouragement to these young scientists to move to Mexico. Finally, they could work with more "pairs of hands" than would have been possible for them in the U.S. or Europe, even though this initially required more personnel training (with its own rewards, it may be noted).

Establishing a Center of Excellence: Problems and Approaches

1. Staffing. The basic assumption is that for all practical purposes no trained research scientists are available locally in the research field under consideration. The key question is how to find the scientific staff. I would like to propose an approach which has the virtue of utilizing in a directorial capacity some of the leading experts in a given field, who under ordinary circumstances could not possibly be hired for such a position. Let us assume that the specific research area has been selected and that 15 scientists at the Ph. D. level are required for the initial program. I would suggest that they be divided into at least three groups, and that the research program of each be directed by a part-time director who will spend no more than seven days three (or possibly four) times a year at the research center. He will be concerned with the overall research program of his group, but will leave the day-to-day supervisory problems to a younger deputy. The five Ph. D. level scientists working in his group should be post-doctoral fellows, who commit themselves to two- or three-year appointments. In areas such as chemistry, such post-doctoral appointments are the rule rather than the exception and the manpower pool is an international one. In my own case, post-doctoral fellows from nearly 25 countries have worked in my laboratory during the past dozen years.

One may ask why such research fellows would wish to work in a research center in a "developing" country rather than in one of the major university centers in the U.S. or Europe. Judging from my own experience with a small Stanford group in Rio de Janeiro, many young post-doctoral fellows are tempted to spend a couple of years in an exciting and, for them, different area of the world, provided it is in association with a well-known scientist in order to be valuable for their eventual career placement. I asked about 50 chemistry graduate students at Stanford University if they would be interested

in working in a research center abroad, using East Africa as a typical location; well over half indicated interest in such a position.

The advantages of this approach are many-fold. No single foreign country would have a predominance among the part-time directors or the post-doctorate staff, and turnover in the latter group would assure no permanent foreign vested interests. On the other hand, within a few years, one would have created an international cadre of scientists, who are familiar with that particular developing country and who may very well retain some link with it even after returning to their own countries. The youth and lack of formality of post-doctoral fellows (frequently with no dependents or with small children who pose no schooling problems) is an enormous advantage in the interaction between local technicians, students, and apprentice research workers, and this foreign group. Ultimately, as qualified research scientists are trained in the country, they will assume permanent positions in the research center, but the flow of foreign post-doctoral fellows should not be cut off, since it will be the most effective protection against scientific inbreeding.

2. Selecting the research field. Initially, an international ad hoc committee of scientists from different disciplines should present a list of possible research fields. These should be active ones in which there is a substantial international reservoir of trained young scientists at the doctorate level. Unusually high capital expenditures should not be required. Eventual long-term technological developments might emanate from such research (novel drugs or insecticides, novel food supplements, new advances in electronics, etc.). Possible local advantages (availability of plant raw material for steroids in Mexico) might exist for conducting such research in a particular country. For instance, many aspects of oceanography, starting with organic chemical work on novel natural products from marine sources and ranging all the way to fundamental marine biological studies, could be a suitable field of research in the proper geographical environment.

3. Operational problems. Attracting the part-time directors, who in turn will be responsible for attracting the post-doctorate fellows, is related to the quality of the research facilities. Duty exemption and rapid import by air without customs delays are minimum conditions. First class equipment, an appropriate scientific library, good physical facilities, and suitable and reasonably priced housing for the foreign post-doctoral staff are essential. The research center may or may not have a formal connection with a university, but in any event there should be intimate informal contact with a university if one exists. In some locations, for instance, certain Latin American countries, official separation from an existing university may be desirable because frequently such institutions have

rules, salary structures, and bureaucratic procedures which could not be tolerated in the research center.

4. Location. The research center must be close to an international airport. This requirement is not only for the convenience of the part-time directors, but is important for rapid delivery of equipment, spare parts, and chemicals on a continuing basis. While the research center might not be part of a university, at least at first, it should be located close to one because of the impact it may have on graduate training. Sharing library facilities should also be an advantage.

5. Financial funding. A ten year commitment is probably a minimum. It is likely that most funds would have to come from abroad. Without specifying the field of research, it is impossible to calculate the cost of capital expenditures. A very rough budget of \$500,000 per annum for operating expenses can be arrived at, and it is obvious that 60 to 80 percent of it would have to be in hard currency:

| | |
|--|-----------|
| 15 post-doctorate fellows | \$150,000 |
| 3 part-time directors | 20,000 |
| 30 local technicians and assistants | 100,000 |
| Administrative manager, staff, secretaries, janitors, etc. | 50,000 |
| Research operating expenses | 100,000 |
| Rent, amortization of equipment, utilities, contingency | 80,000 |
| Annual Operating Total | \$500,000 |

The main question is whether it is worthwhile establishing a center of excellence for basic research in a developing country at all. Only careful consideration of the research field, staff, operational problems, and location can resolve this question. The finance may then be sought in a variety of quarters. Such a center for research may also serve as the prototype for an international scientific "peace corps" of very high educational caliber which may prove viable and useful in other areas as well.

[Excerpted from "A High Priority? Research Centers in Developing Nations," Bulletin of the Atomic Scientists. Chicago (Ill.): the Educational Foundation for Nuclear Science, Vol. XXIV, No. 1, January 1968, pp. 22-27.]

SCIENTIFIC MANPOWER IN INDIA

[Brain drain problems arise, in part, because professionals are not used to best advantage in developing countries. These problems can be seen in India from two angles: 1) the results of the Scientists Pool Scheme for repatriation of trained men and women; and 2) a survey of current utilization of scientific manpower.]

One. P. M. Abraham, Joint Director of the Institute of Applied Manpower Research, New Delhi.

FIRST DECADE OF THE SCIENTISTS POOL

The object of the Scientists Pool (created late in 1958) has been to provide temporary placement for well qualified Indian scientists and technologists returning from abroad where they can utilize their knowledge and, at the same time, look around for a more or less permanent regular job. [see Development Digest, April 1966, pp. 28-35.] It was found that the process of recruitment, especially in government departments, requires about six to twelve months for its completion; personal interviews with applicants are invariably insisted upon.

The Scientists Pool is neither intended nor is it empowered to bring about any transformation in the conditions obtaining in the labor market in India. The Pool scheme is intended for those abroad who would like to return to India but who are discouraged by the prospect of having to wait for periods of six months or more for recruitment procedures to be completed. A further limitation which does not seem to be appreciated by many of its critics is that the Pool can at best play a limited role in securing regular placement for its officers. If there are not enough vacancies in the country, or if Pool members are reluctant to take up jobs which they consider unsuitable in pay or location, etc., the Pool will not be able to help them. It remains the duty of the Pool member himself to seek and obtain regular placement.

Viewed in this context, the fact that some 2,300 scientists and others returned to India during the last nine years via the Scientists Pool is, *prima facie*, a substantial achievement. However, it is not known how many of them would have returned in the absence of the Scientists Pool. The Council of Scientific and Industrial Research is studying this aspect through a survey covering the Pool officers. The expenditure for the Pool scheme is met entirely by the Government of India. From a modest level of Rs 19,200 in 1959-60, it rose to Rs 4.795 million by 1966-67 [$\$1 = \text{Rs } 7.5$]. During this seven-year period, Rs 19.694 million have been spent on the Pool scheme. The total number of officers who joined the Pool during the period is 2,370, and an average expenditure of Rs 8,309 was incurred for each officer.

Selection

Admission to the Scientists Pool was restricted to persons possessing post-graduate qualifications in medicine, science and technology to start with. Subsequently in 1964, Social Scientists (including persons with high qualifications in Humanities) were also made eligible for selection, but their number may not exceed 40 at a time. Selection to the Pool is largely from among those who have foreign qualifications or experience, although persons with outstanding qualifications from Indian Universities are also considered and in 1967 5 percent of those chosen had no foreign degrees.

In recent years, selections included about one third scientists, one third medical doctors, and one third engineers and technologists. Selection of doctors to the Pool has shown a rising trend from 12 percent of the total selections in 1959 to 36.7 percent in 1967. The relative proportions of various fields of study among those selected and those actually joining is interesting. Engineers selected to the Pool seem to have utilized the Pool to a considerably lesser extent (32 percent in 1959-67) than scientists and doctors (40-50 percent). It is unlikely that engineers have found it any easier to get jobs than doctors. A more plausible reason is that a larger proportion of engineers stay on abroad without returning to the country as compared to scientists and doctors.

The tempo of selection to the Pool, after a spell of rapid acceleration during 1963 and 1964, has now decelerated. The liberalization of selection standards in the wake of the emergency in 1962 is now no longer found necessary. In addition, the accumulating evidence regarding the difficulties of Pool officers in getting regular jobs has induced a more rigorous approach to the selection of Pool officers. The trends in the numbers selected, joining and leaving the Pool may be seen in Table 1.

Table 1

Selection to the Scientists Pool (1959-67)

| Year | Number Selected | Number Who Joined | Number Leaving the Pool | Number in Pool, end of Year |
|------|--------------------|-------------------------|-------------------------------|-----------------------------------|
| 1959 | 197 | 12 | 2 | 10 |
| 1960 | 163 | 75 | 21 | 64 |
| 1961 | 527 | 169 | 48 | 185 |
| 1962 | 393 | 217 | 125 | 277 |
| 1963 | 839 | 402 | 214 | 465 |
| 1964 | 1, 139 | 436 | 362 | 539 |
| 1965 | 969 | 454 | 344 | 649 |
| 1966 | 629 | 339 | 460 | 528 |
| 1967 | 607 | 260 | 371 | 417 |

The strength of the Pool was originally fixed at 100. It was raised in various stages to 500 in September 1962, and at present there is no ceiling. This is intended to ensure that no deserving person is kept out of the Pool because of any formal restriction on the total number. However, the funds made available by the government for the Pool do in effect constitute a restriction on the total number of officers who can be recruited. The strength of the Pool stood above 600 during 1965, but since then it has come down considerably with only about 400 left at the start of 1968.

Recruitment Procedure

During the first few years, selections were made in bulk at annual intervals. It was decided in January, 1960 that candidates should also be selected between bulk selections in order to avoid the waiting period. At present, therefore, there is an open and continuous recruitment. Those registered in the Indians Abroad Section of the National Register are automatically considered for selections to the Pool. Our Missions abroad, and Ministries, may bring to notice persons who are suitable for selection. Most of the selections are made on the basis of academic records and experience; it is very seldom that the Special Recruitment Board interviews a candidate.

Service Conditions

An appointment in the Scientists Pool is intended to be purely temporary. When fixing salaries, care is taken to see that the pay is not so attractive as to induce the Pool officer to stay on in the Pool without making serious efforts to get employment elsewhere. Out of 423 who left the Pool and about whom information is available,

79.3 percent got salaries higher by Rs 100 or more per month on leaving the Pool; and for 63.8 percent the difference was Rs 400 or more.

During their stay in the Pool, they are attached to organizations such as universities, laboratories, hospitals, government departments, etc. For example, the distribution of Pool officers working on January 1, 1968, among different organizations shows 53 percent were attached to universities, and 22 percent to research organizations. Those attached to industrial enterprises constituted only a small minority.

Placement and Absorption

The number of officers selected to the Pool showed a rising trend during most of the past nine years, as did the number of officers who have been leaving the Pool on getting employment elsewhere. Gradually, however, a tendency for the average duration of stay in the Pool to lengthen began to manifest itself, and the Pool began to develop a hard core of officers who tended to stay on for two years or more. As prolonged stay of an officer in the Pool makes it difficult for fresh candidates to be selected, it was decided in 1965 to review the cases of officers who remained in the Pool for over 18 months. In a number of cases, stay in the Pool was terminated. The Pool authorities have also started to specify the tenure initially as one year in the offer of appointment in many cases; about 67 percent of the appointments made in 1967 were restricted to one year.

The Scientists Pool scheme was formulated at a time when critical shortages of high level manpower clearly existed. But the primary objective of the scheme was not to meet manpower shortages. It was felt that an opportunity must be given to Indians overseas to come home and to participate in national development; this was considered a desirable aim in itself. Therefore it was not purely a "manpower approach;" if it were, arrangements would have been made in some form for evaluating the suitability of candidates vis-a-vis the vacancies in India. Instead, the main criteria for selection were the willingness of the person to join the Pool and his academic qualifications; the likely availability of a job in India also figured in the selections but only in a vague and general way.

The steep fall in the number of selections in recent years is undoubtedly due to the adoption of a more rigorous standard of selection, induced largely by the difficulties of Pool officers in getting themselves absorbed in regular jobs. It is perhaps felt that Pool officers selected on the basis of more rigorous standards will be more easily absorbed in the labor market than others. But as long as the Pool is not intended as a recruitment agency, matching

individuals with specific vacancies, rigorous selection standards by themselves are not likely to ensure quick absorption.

It is true that the earlier expectation that highly qualified scientists would find suitable and acceptable jobs in India without difficulty has not been borne out by the experience of the past few years. Despite these difficulties, a liberal approach to selections to the Pool is to be preferred to a rigorous one. A necessary corollary to this should be that tenure in the Pool should be strictly limited to a period of, say, one year. This would afford a reasonable opportunity to all those who are genuinely interested in seeking a job in India to do so.

[Excerpted from "Regaining High Level Indian Manpower from Abroad—A Review of Policies, Programmes and Problems," Manpower Journal. New Delhi: Institute of Applied Manpower Research, Vol. III, No. 4, January-March 1968, pp. 88-96, 98-102, and 105-108.]

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UTILIZATION OF SCIENTIFIC MANPOWER

Scientists have so far received very little attention in our manpower planning. Engineering manpower received early priority; medical and health personnel also received attention; but the importance of basic science has come to be appreciated only recently. India is now producing about 40,000 bachelor of science graduates annually, 6,000 agricultural graduates, and over 10,000 post-graduate scientists.

Occupational Pattern

There are today over 300,000 B.Sc. graduates, the largest group of whom are teaching in schools (see Table 2). Those working in the universities, colleges or polytechnics are mostly employed as laboratory assistants or in workshops, sometimes in their administrative sections. Similar would be the pattern of employment of those who come under research or survey organizations. In the Central and State Governments, science graduates are employed in technical, semi-technical as well as non-technical work.

Table 2
Occupational Pattern of Graduates (B. Sc.)
in General Science

| Occupation/Sector | Percent |
|---|------------|
| 1. School Teaching | 32 |
| 2. University/College/Polytechnic | 7 |
| 3. Research/Survey | 5 |
| 4. Central Government | 14 |
| 5. State Government | 21 |
| 6. Public Sector Industry and Commerce | 5 |
| 7. Private Sector Industry and Commerce | 16 |
| | <u>100</u> |

A high degree of unemployment prevails among science graduates. Wastage of scientific education in non-technical vocations is also very high. During the 1961 census, unemployment among science graduates stood at 16 percent and non-technical employment at 40 percent. Among agricultural graduates, now about 36,000, unemployment and employment in non-technical vocations accounted for 4 percent and 5 percent respectively in 1961 (see Table 3). For post-graduate scientists, the rates were 7.0 and 16.7 percent. Simultaneously with unemployment of scientific and technical personnel, there are numerous positions lying vacant, some of them having remained unfilled for over a year.

Table 3
Non-Utilization of Scientists
(Year: 1961)

| | Unemployment (%) | Non-Technical Employment (%) |
|-------------------------|------------------|------------------------------|
| Science Graduates | 16.0 | 40.0 |
| Science Post-Graduates: | 7.0 | 16.7 |
| Physics | 4.9 | 16.1 |
| Chemistry | 5.7 | 13.5 |
| Mathematics | 7.1 | 25.2 |
| Statistics | 7.7 | 23.9 |
| Agriculture | 4.7 | 12.1 |
| Zoology and Botany | 9.3 | 12.5 |
| Geology and Geophysics | 10.6 | 13.3 |
| Agriculture Graduates | 4.0 | 5.0 |

As of the end of 1967 our stock of scientists who hold at least a Master's degree is over 100,000. Among them, about one in eight

holds a doctorate (a larger proportion of the Americans go on for a Ph. D.). Indian universities awarded 545 Ph. D. degrees in science in 1963-64; the total number of Ph. D. degrees acquired by Indian scientists from overseas universities is about comparable to the number of Ph. D. degrees awarded by Indian universities in recent years.

Three-fourths of the post-graduates are engaged in research and teaching; and one out of four of those engaged in research possesses a doctorate degree. Among the post-graduates working in Indian universities, 65 percent are doing teaching-cum-research work and 35 percent perform purely teaching duties. About 8,000 persons holding a Master's degree in science are teaching in secondary schools.

Employment in Industry

Less than 10 percent of the post-graduate scientists are in industrial employment and less than 5 percent of the Ph. D. scientists are employed in manufacturing industry. One-third (34 percent) of the American science personnel are employed by their industry and business houses. While it is true that Indian industry is far behind, this fact alone does not explain the poor state of employment of scientists.

The low industrial employment of the science doctorates in India is partly due to a lack of awareness on the part of the industrialists of the utility of such scientists. To most of our industries, persons with Master's or Doctorate degrees are considered "over-qualified" personnel not suited to their requirements. This is primarily a question of attitude. This may have two implications: first, Indian industries are mostly based on foreign know-how which has already incorporated research and development elements in the country of origin; and secondly, because of the lack of competition in the indigenous sector the need for continuous improvement of technology, process or product is not recognized as vital.

On the other hand, it is also likely that the Ph. D. degree holders are reluctant to work in industry. Considering, however, that over one-third of the doctorate degree holders have turned to non-research pursuits, there is no reason to believe that they are averse to joining industrial concerns; in fact many of them are known, informally, to be interested in joining industry. Our scientists could play a significant role in industry in two ways: 1) The transplanted technology needs scientific study if we do not want to buy foreign technology all the time. Such studies are necessary either to improve our future installations or to adapt them, or even for working with them intelligently. 2) Scientists and technologists are necessary not only for evolving or improving the know-how but also for scientific management and planning, as observed by Professor P. M. S. Blackett in his recent Nehru Memorial Lecture.

The employment of post-graduate mathematicians is low in industry and other technical work. Teaching and research are practically their only vocations. One out of every four mathematicians or statisticians takes up some non-teaching or non-technical job. In the Western countries mathematicians are in demand for industrial management, quality control in production and operational research.

Situation of Geologists

The number of geologists and geophysicists is extremely low for the country, judging by the fact that India, with 1 1/4 million square miles of area, possesses large geological and mineralogical resources which have not been adequately explored and surveyed. Yet, even this small number of geologists and geophysicists faces the highest degree of unemployment and for this reason students are being discouraged from taking up these courses. Because of the high incidence of unemployment among geologists and geophysicists one might conclude that India does not need them, but this would be wrong. We are engaging foreign contractors to do our geological work. In February 1967 we contracted for foreign collaboration in "Operation Hard Rock," which is India's most ambitious non-ferrous mineral exploration program. Under the contract, only about 50 officers of the Geological Survey of India will be associated with the program. The implication vis-a-vis Indian geologists and geophysicists can be imagined.

Remedies

We need some bold lines of action to remedy the present situation. The following are suggested:

1. Shift of emphasis to industrial employment for scientific personnel.
2. Establishment of Research and Development Departments in larger industries for improving products and processes through the service of scientists.
3. Greater participation of scientists in mineral, agricultural, forest and other resource surveys and assessments.
4. Filling vacant scientific posts without delay.
5. Selectively attracting into teaching and technical jobs those scientists who are unemployed or have drifted into non-technical jobs.

[Excerpted from "Scientific Manpower—Review of Characteristics of Stock and Problems of Utilisation," Manpower Journal. New Delhi: Institute of Applied Manpower Research, Vol. III, No. 4, January-March 1968, pp. 29-42.]

THE USE OF THE TECHNOLOGIST IN ASIA

Gregory Henderson

[The increasing flow of trained men from Asia to the U. S. suggests a lack of adjustment of Asian societies to the place of the modern technician. Japan is a striking exception. Causes may be found in historical contrasts between recently feudal Japan and the centralized bureaucratic Asian societies.]

There is in Asian cultures not only the problem of techniques but of the technician: how he is used in old societies and how he feels used.

We are, I think, in the midst of a time of re-examination—we might almost call it agonized reappraisal—of his role in development. We started on the development track with the belief that if one pumped in large amounts of capital, development and technology were the likely outcomes. Such cause and effect occurred rapidly in Germany and Japan which had ample trained men and had "only" been destroyed. But it usually did not happen strikingly in countries lacking trained men. We then pursued policies of producing development by training and education, as well as by foreign experts. And we have recently reached the stage where we again find that even capital plus trained men and women do not necessarily produce development.

We are confronted with an increasing flight of trained men from their own developing societies toward developed centers. In 1956, 8,539 engineers, scientists and medical doctors entered the U. S. as immigrants of whom only 2,231 (about 25 percent),

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were from developing countries; in fiscal year (FY) 1965, 11,749 entered of whom 3,604 came from developing countries (about a third). In FY 1966, 13,449 came with 5,540 from developing countries (about 40 percent); in FY 1967, 20,760 came, 10,254 of whom came from developing countries (50 percent). Of the latter, 6,391 came from Asia with roughly 1,500 each from the Philippines, Taiwan, and India. Hence, in a decade, the proportion of our technological imports from the developing countries, especially Asia, has doubled and the numbers have almost quintupled. In 1967 the U.S. got in highly trained Asian manpower nearly three times what it received a decade ago from the entire developing world. In 1967 the U.S. imported more foreign medical doctors, the majority from developing countries, than it graduated from its own medical schools. In the same year we adjusted from temporary to permanent status four times as many professionals from developing countries as we had two years before. And even these statistics are likely to be understated in respect to Asia's contribution since the large U.S. professional manpower imports from Canada and some even from Britain are known to include many persons from the developing world.

Nor is the end in sight. An awesome backlog of some 50,000 qualified third preference applicants was authoritatively estimated to be awaiting the coming into full effect on July 1, 1968, of the 1965 Immigration Act, most from developing countries. The U.S. is by no means alone. Britain loses some 35-40 percent of its new medical doctors, gets about one-third from developing countries. Canada sets out to get them and does. 12,000 former South Saharan African students have reportedly remained in France with their families. Germany is not immune.

Basic Malfunction

The tempo increases, with Asia in the vanguard of this withdrawal of technologists from development. Asia needs technologists, but are her technologists willing to stick with Asia? While a full appraisal of the meaning of the professional migration phenomenon seems still not possible, there is an adequate demonstration, I think, that all is not well with the professional and the technician in his niche in Asian societies. There is malfunction. No doubt this malfunction concerns partly education, salary levels and surpluses. But perhaps not basically: professional talent is as well paid, usually better in terms of local wage levels, in developing societies than are professionals in any developed country in terms of theirs. The head of the Indian meteorological service is paid upwards of 40 times the salary of the man who carries papers around his office; the head of the American meteorological service is paid only some six times the salary of the man who carries papers around his office. Gaps between rich and poor countries have effect, but again,

perhaps, more to provide an alternative for those who find it easier to emigrate than to change their own societies which give them what they consider to be an inadequate professional home. Deeper down, ancient Asian societies have yet to adapt themselves fully to the modern technologist and he to them.

Yet, the case of Japan stares us in the face. Japan is unique in Asia in two respects—in keeping her own corps of experts, and in bringing to the threshold of modern times a recognizably feudal society. This meant that she early developed strong intermediary organizations between village and throne. Japan's was not simply an authoritarian court which monopolized all values but a plural power system with a weak court which had some values, a shogunal court with more, courts of local lords who were strong and had their own hierarchies and production centers, and, largely outside these, flourishing guilds and proud merchant societies. In basic terms, 18th to mid-19th century Germany could also be almost so described.

Such pluralistic power had social consequence. Japan's society tended to shatter the image of omnicompetence in men, the very commodity which China always ascribed to its officials. Just as the emperor delegated (or was forced to cede) his military and most temporal powers to a shogun, and the shogun divided some of his up among his liege lords, so they, in turn, developed fiscal, production, ritual, scholarly and other functional differentiation in their own courts partly because this was the pattern, partly to support their own powers against many rivals in a pluralist power system. Each class and occupation, with one or two exceptions, had its definite and accepted value and sense of pride. Men wanted to improve the quality of the work they did and pass technical mastery, such as sword-making, on to their sons. They were proud of their craft. It was no trait inborn; it was one evoked by the type of society the Japanese lived in and the clear context, articulation and value which the structure of that society gave to specialization.

In contrast, China, Korea and some other Asian societies had centralized bureaucratic systems. Power was, in general, not pluralistic. It was concentrated to the greatest degree possible in one place. The values of the society were also centrally glued; value centered around being an official, chief value around being a central official. Within the Far East, Confucian society, particularly, stressed the omnicompetence of the classically-educated official to make judgments in almost any area: law, diplomatic relations, the maintenance of waterways, trade and commerce, fortification-building, fiscal affairs and even military strategy and tactics. In Korea, specialists were denigrated by being socially pinned to immobility and confined permanently to lower ranks, whereas the

generalist was not only mobile within his own class, he might even be mobile between classes if he could act the role and could keep his background hidden.

Here we have a meaningful contrast, between the place of a specialist, a technician, a professional in Japanese society and that in a number of other Asian societies. The feudal sword-maker becomes a steel worker or foreman in Krupp or Yawata; or he becomes a research scientist in a laboratory in Dusseldorf or Tokyo testing the qualities of steels. In all such occupations he finds a context of pride and value built into his social structure from the past. To the type of developing society honoring technicians which feudalism left in its wake, the educated Japanese has almost always been willing to return.

There is another social contrast bearing on the willingness of the technologists to stick with Asia or his willingness to emigrate. There are cultural contrasts in mobility. Where occupations were strongly valued, strong inspection and supervision all the way down the line, as in Japan, tended to raise standards and pride and produce strong occupational and class identifications together with a tendency to stay within them. Technicians had a profession, a calling. There was a natural, a structural avoidance of mobility, an avoidance which though reinforced by appeals to loyalty, inhered in the system and its values.

Central bureaucratic societies had mobility situations quite different. There was avoidance behavior vis a vis careers in techniques and specialties and an unintentional and often covert tendency toward mobility, melding and homogenization. The elite thus had a need to impose class distinctions with hard but partly artificial definitions, which had the effect of casting most of the population in pejorative roles. Technical occupations which could not fill the role of prestige omnicompetence therefore tended not to be characterized by pride or self-respect; there was anxiety not to sharpen specialist definitions by working hard at them and improving them, and there was not the sense of profession or calling which one was proud to transmit to one's son. For example, it is fairly clear that the end of a brilliant ceramic industry which had lasted 1,500 years in Korea was motivated in important part by the fact that potters were despised specialists in a society which, by the late 19th century, was offering increasing mobility for those many within it who were not sharply identified as specialists.

Hence not only was the place of the technician different. So also was his built-in assumption of mobility. The social system tended to raise mobility hopes. When old societies started crumbling in non-feudal, central bureaucratic Asia, these old hopes became the

puissant expectations of youth. In colonial situations, men used foreign systems—Christianity, colonial bureaucracies, armies or educational systems—to climb out of their social holes. Such mobility started entirely within the society, but it is now international. It seems to be an important conditioner of the kind of attitude which the individual brings toward society anywhere and his place therein. If mobility is one's basic assumption, the ties one forms tend to be less colored with permanence. One does not tighten one's ties, let alone confine them to the group into which one was born and which one now wants to leave. One tends to seek out those above one to tie to; but these ties, too, lack the kind of permanence which those with one's own group can have. Such instincts, easily transferred to the international stage, are brought with the student or the professional when he goes abroad, giving him a lesser psychological commitment to home base and an eagerness to adapt to what he finds "above."

Thus when the relentless generosity of post-1946 international education programs—private even more than public—reached down to help the professional worlds of developing countries, these opportunities were easily grasped by men who brought within themselves instinctual thinking about education abroad in terms of a mobility ladder taking them out of their native lands. For them large countries, and the elaborate and expensive research and industrial facilities they contained, became magnetic substitutes for the central courts which once had capped their own ancient vortex societies and stood as lodestars to their own mobility systems.

There is a most important problem for societies with mobile, non-feudalistic cultures in building the kind of organizational nets which can catch the upward mobility process and adapt mobile technical talent into an instrument with enough continuity to develop techniques, science and industrial advance and compete in lures and attractiveness with the systems of larger countries. The United States, a quite mobile society without a feudal background (or, at least, without one which took place within this country) is not exempt from some problems of this sort. The U.S. has a system of high job mobility and, for example, in the electronics industry, high movement from company to company. This mobile system may, in fact, be one of the less-remarked appeals of the U.S. to the foreign technician from a fluid society. It is terribly hard for developing countries to achieve the sheer quantity of industry and scientific and technological establishments within which men can be fluid.

The Remedy

If there is to be remedy, it will demand much organizational ingenuity in the developing societies involved. There must be an

unusual amount of upward communication, more than was required in German or Japanese organization. There should be maximal chances not only to climb within the organization but to have hierarchical experience outside it, exchange professorships or comparable arrangements for industry. There should also be planned attempts nationally to build a stepped institutional chain into societies which have lacked it: this time, of course, an industrial, educational or technological stepped chain. We should seek to spread institutional life below the capital and to create stepped merit systems in which the value of local effort is specifically expressed. The creation of regional institutions may help if positions within them can be keyed in with mobility systems at home. There may well be forms yet unborn which can relieve the problem once the problem is understood. It is above all a realm for great social and institutional imagination.

[Condensed from "Modern Technology and Ancient Societies in Asia: The Use of the Technologist," a paper presented to the Tenth Anniversary Conference of the Society for International Development, Washington, D. C., 6-9 March 1968. To be published in International Development 1968, John Adler (ed.). Dobbs Ferry (N. Y.): Oceana Publications, Inc., 1969.]

FOREIGN INVESTMENT



WORKMEN AT THE SHELL OIL INSTALLATION AT
PUERTO MIRANDA, MARACAIBO, VENEZUELA.
(PHOTO: U. S. AGENCY FOR INTERNATIONAL DEVELOPMENT)

CONFLICT AND RESOLUTION

Raymond Vernon

[Most of the less-developed countries of the world are prepared to invite foreign investors inside their borders, and many foreign investors are prepared to take a serious look at the opportunities offered. Yet only a small number of such arrangements are actually consummated. One of the major factors which contribute to the lack of direct investment is the struggle between foreign business and local government over control of any proposed investment.]

In a simple economic model, an investment will be attractive to the investor if the prospective yield to him exceeds his cost of capital and is the highest of the available alternatives; and it will be attractive to the host country if the prospective payment to the investor is lower than the social yield and the lowest of all possible alternatives. The questions which motivate and preoccupy both the investor and the host country, however, are much more than questions of the price and yield on capital.

The host country view. There are many host countries, with points of view that differ in intensity and detail; and there are warring factions within host countries, eager to exploit the foreign investment issue or any other issue if it will advance their interests inside the body politic. Yet some representative generalizations can be made.

One well-advertised concern of the less-developed nations with respect to foreign direct investments relates to their balance-of-payment effects. They

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assume that foreign investment cannot be counted on automatically to generate its own exchange requirements, partly because national resources cannot easily be shifted from their existing uses to uses that earn or conserve added foreign exchange, and partly for other reasons. As a result they sometimes turn down foreign investment proposals or insist that part of the equity should be raised from domestic sources.

However, the case for worrying about foreign direct investment, when based on capital-cost or balance-of-payment grounds, seems hardly firm enough to explain the intensity and universality of the less-developed countries' reactions. In 1966, the investment of U.S. manufacturing companies in the less-developed countries stood at about \$3.5 billions while the local value added annually by such companies was something over \$3 billions. The annual income remissions to U.S. parents, on the other hand, were on the order of only \$200 millions. These figures, taken by themselves, are not of the sort that would stir expressions of concern about the cost or the balance-of-payment implications of foreign investment. Those expressions, in my view, are usually proxies for another kind of worry—the worry that such investment may lead to a dilution of the country's control over its national industries.

The motives behind the desire for national control differ; as a rule, the desire for control comes most strongly out of the government sector. At times, that desire finds expression in the policy of reserving certain industries for state ownership. State ownership provides a secure and easy way to tax a specific commodity such as tobacco, or to subsidize a commodity such as fertilizer. State ownership also offers an outlet for the creative energies of the military or the civil service.

More often, however, national control may be important to the less-developed economies for other reasons. A continuous and intimate dirigiste relationship usually exists between governments and businessmen in such economies, especially during the industrializing phase. Businessmen are the object of a stream of signals from government: advice to control price rises in inflation, to provide credit or materials or capital to favored enterprises, and so on. At the same time, the local entrepreneurs are themselves the originators of a series of demands on government: for protection from outside competition, for relief from the enforcement of existing tax laws or price ceilings, and much more.

There have been cases in which foreign-owned enterprises have managed successfully and unobtrusively to take their place on the national communication grid. But the presence of the foreign enterprise is usually seen by both government and the private sector as a

disturbing force. It is disturbing not only because of the enterprises' assumed reluctance or inability to participate in the intimate local network of communication, but also because of their putative capability for avoiding the impact of any signals that the network issues. They are assumed to be able with great facility to transfer resources into the country and out again, which is seen as a challenge to local control.

The loss of control takes a more explicit and more threatening form from the viewpoint of the host government when another government becomes involved in the affairs of the subsidiary. For instance, the parent company may importune its government for help in protecting the subsidiary from "unfair" treatment at the hands of the host; or the government of the parent company may relay a command to the subsidiary—a command to perform, or to desist from performing, some act inside the economy of the host government. Will the host countries, when pressing those companies for greater output or higher taxes, be pulled up short by counterpressure, e. g., exerted through a foreign aid program?

The investor's view. If the views of investors were to be taken at face value, the largest single obstacle to investment in the less-developed countries would be the "poor climate" provided by host governments. At the root of the problem lies the ineluctable fact that less-developed countries present a chancey environment to the prospective investor. Many businessmen are prepared to accept some uncertainties as an unavoidable element of existence, and are prepared to rely upon a capacity to shift strategies as their main defense. But if they fear that they may not be allowed to make the shifts as uncertainties arise, the environment is regarded as especially hostile. Beyond that, if the government is thought to have a propensity for injecting new uncertainties into the environment, through measures such as devaluations or price freezes, the "climate" is said to be especially "poor." A characteristic response of investors in such circumstances is either to reject the proposed investment or to tie up the government with guarantees and assurances aimed at reducing the uncertainty to tolerable levels and at regaining a certain measure of control.

Control is desired not only to deal with uncertainty but also to ensure that the operations of the subsidiary are related to those of the parent in ways that best serve the investor's total interests. To the extent that the investor is interested in profit, the relevant profit is that of the total network of the investor's interests, not necessarily that of the prospective subsidiary alone. Even if a subsidiary investment appears to yield very little profit directly, it may yield profits that are captured in a downstream affiliate, or it may provide a captive outlet for the intermediate goods produced by

the parent. Or it may be providing security to the system as a whole, because it represents an offset to a move made by a rival firm in an oligopolistic industry; for instance, if the rival establishes a beachhead in a new market or a new materials-producing area that might eventually prove important, prudence may suggest that establishment of an offsetting beachhead in the same terrain, however underdeveloped and uncertain that terrain may be.

The return which the investor is seeking to maximize may not at all be a return on finance capital. Factors other than capital may be regarded as the relatively scarce inputs, on which quasi-rents can be captured. One such scarce factor—especially relevant to the prospective investor when considering whether to invest in a new source of supply—is an established market position, rendered secure by a strong distribution system or by patents. Another scarce factor is an established organization capable of performing certain relatively difficult acts, such as identifying technological needs and generating a relevant response. How to secure the maximum yield on these joint resources of the system then becomes the object of the business strategy, which may be imperilled if control over the subsidiary is uncertain.

The issue of control, therefore, emerges as a major pre-occupation not only of the host government but also of the investor. The critical question for any policymaker is whether the needs of both parties can simultaneously be served.

Shaping the Reconciliation

Some alternative arrangements. The resulting conflict leads to a consideration of many different arrangements. One can think of four "pure" types, always bearing in mind that reality itself is a good deal more hybrid and more complex. In descending order of foreign control, these are:

1. the wholly-owned subsidiary—a corporate entity created under the local law of the host country, wholly owned and wholly managed by the foreign investor;
2. the joint venture—a corporate entity created under local law, partially owned by local private or public interests, and managed according to policies responsive in part to those local interests;
3. the co-production agreement—an agreement between a foreigner and an entity owned and managed by public authorities in the host country, under which: the entity acquires specified machinery and technology from the foreigner; is committed to producing specified products; and over a period of years, it

pays the foreigner for the machinery and technology in kind in specified products;

4. the technical assistance agreement—an agreement between a foreigner and an entity created under local law and owned by local public or private interests, in which the foreigner provides management services, technical information, or both, and receives payment in money.

The labels, of course, can sometimes be misleading. One can find cases in which a parent that nominally "owns" a wholly-owned subsidiary is restrained in its power to shape the subsidiary's policies; and cases in which the foreign "manager" of a local enterprise actually has a range of powers equivalent to an unrestrained owner. But those are the exceptional ones.

| <u>Form of Arrangement</u> | <u>Resource Transfer</u> | | <u>Management and Information</u> |
|--------------------------------|---|---|-----------------------------------|
| | <u>Capital</u> | <u>Foreign Market Access</u> | |
| Wholly-owned subsidiary (WOS) | Equity portion only | Unlimited for raw materials; extremely limited for manufactures | Unlimited |
| Joint venture (JV) | Less than WOS | Equal to or less than WOS | Less than WOS |
| Co-production agreement (CPA) | In economic equivalents, probably less than WOS or JV | Limited; but guaranteed within its limits | Less than WOS or JV |
| Technical assistance agreement | Less than WOS, JV or CPA | Less than WOS, JV or CPA | Less than WOS, JV or CPA |

In general, the table reflects in crude form a fairly clear trade-off on the part of host countries. To reduce the foreigner's control, host countries are prepared to accept less in the way of valuable resources. Which of these approaches is the better "bargain," therefore, is thoroughly indeterminate; all depends on the value of what the host country foregoes by reason of not acquiring resources, measured against what is achieved by reducing the foreigner's control.

The question of changing needs on the part of the host country is especially important. To appreciate how these changes come about and what they imply, we must next explore three major types of foreign investment in the less-developed countries: the raw-material producing facility; the facility for the production of import-substituting goods; and the facility for the production and export of manufactured goods.

Raw-material investments. Investments to exploit raw materials cover a wide spectrum of situations. At one end are products like oil, copper, and bauxite for which the production process is relatively capital-intensive and requires a certain amount of organization, management, and technical skill. It generates a product that is characteristically marketed in closed channels, by sales between affiliates. The evidence suggests that in such cases raw material investment is usually made because users prefer to control their own sources, even if such use involves the absorption of relatively high freight costs. This preference may reflect the existence of a strategy among vertically-integrated firms, no one of which is willing to be at the mercy of the others in time of raw material shortage. It may also reflect the technical desirability of relating a user plant to a single raw material source because of physical variations in the raw materials drawn from different sources.

At the other end of the spectrum are investments in the production of materials such as cotton, coffee, and sugar. Here, capital, training and technical skill may be important in reducing costs and increasing yields. But a variety of different production methods are possible; a larger proportion of sales may be made in the open market; and the entry of new producers is relatively easy.

This classification suggests a great deal about the bargaining strength of foreign investors relative to host governments. Where high capital inputs, difficult management and information requirements, product differentiation, and the strategic need for a tied production source go hand in hand, the host government confronts a well-entrenched bargainer.

But no industry, however tightly organized, remains unchanged in structure over many decades. The sources of raw materials continue to multiply as long as they are in demand. At the same time, the smelters, refineries, and mills that provide the initial treatment of raw materials are constantly growing in number. Opportunities for new entrants at the processing level periodically arise; and if they do not arise as a result of market growth, they are now being generated artificially by governmental action. Therefore, as the number of buyers and sellers has multiplied, tight oligopoly structures have been known to show signs of ravelling.

Consider, for example, the rapid change in the apparent bargaining positions of investors and host governments in the field of petroleum. Host governments have demanded and have managed to get increasing shares of the profits, and, most recently, also a voice in the management of the producing facilities. OPEC's (Organization of Petroleum Exporting Countries) steady pressure for involvement in the pricing and production policies of the oil companies is telling evidence of the trend. Exporting governments are even beginning to develop foreign marketing capabilities of their own, as evidenced by some of the operations of Iran's NIOC (National Iranian Oil Company). My interpretation of the root cause of these trends is the decline in the negotiating strength of the international oil companies, due to: 1) the proliferation of crude oil sources; 2) the growing availability of packaged refineries purchasable on a turnkey basis; and 3) the greater ease with which such operations can be financed, due to the appearance of new financial sources such as the World Bank institutions and the regional banks. In brief, the capacity of the international oil companies for providing markets, management and capital, while still of major importance to foreign governments, no longer appears as utterly indispensable as it did a few decades ago.

Observe some of the implications of that interpretation, however. Raw material producing countries are in a stronger position to demand joint ventures or co-production agreements or management contracts, as indeed they have been doing. But these countries, while overcoming one form of dominance—of the foreign investor—are exposing themselves to another. Although the market for oil and copper is hardly likely to reach the competitive condition of markets for coffee, cotton and sugar, this is the direction of its movement. The oligopoly stability that each producing country so patently desires depends at present upon continuing the direct tie between the producing facilities in its territory and the marketing facilities with which it is linked. That tie is now provided by the multinational enterprise, whose integrated strategy aims at providing an assured market for a predictable output. In measure as the producing countries gain a voice in management prerogatives, the foreign enterprises have less incentive to try to maintain the direct link between production and marketing.

The import-substituting manufacturing investment. The advantages that a less-developed country sees in any given foreign investment in its economy tend to decline as the enterprise ages. This is a generalization that requires numerous caveats, of course. If the foreign investor rapidly alters the character of his investment after it is established—if, for instance, he turns from automobile assembly to automobile manufacture—the new activities may prove even more attractive to host governments than the original ones. On the

other hand, if the general nature of the investment remains unchanged during its life, then there is a strong case for the view that its attractiveness to the host economy will decline.

The most obvious and most valuable infusions of capital and technology usually take place at the beginning of the undertaking; after the first importation of capital, very little of the subsequent growth is financed through funds from outside the host country. After the early transplant of technology and managerial assistance, the occult character of those contributions probably also declines in the eyes of host governments. Local businessmen arise who seem willing and able to take over the business.

The older a given technology, the more likely that the new entrants using the technology will set up their plants free of the innovator's control. Nations manage to avoid foreign control more effectively when their new enterprises involve a long-established technology than when such enterprises are at the forefront of industrial innovation.

The form of enterprise, however, depends not only on the interests of the host country but also on the interests of the foreign investor. As often as not, according to the evidence, foreign investors in less-developed countries make their initial import-substituting investments under duress, usually under fear of exclusion from a market that had initially been developed by means of exports from the parent firm. Characteristically, the initial investment has been held down to the smallest possible commitment necessary for market access, such as a packaging plant in the case of drugs or an assembly plant in the case of automobiles. Eventually, the commitment has deepened and broadened, sometimes under pressure from the host government, sometimes as a result of the development of reliable local sources for inputs.

In many of these cases, foreigners have been quite willing to accept an arrangement in which control was shared with local interests. If the initial commitment was to consist of nothing more than the processing and sale of quality-controlled and name-branded materials provided by the parent company for marketing solely in the local market, then the presence of a local partner in the venture did not seriously impair the firm's essential strategy. If deviations from international quality or pricing practices were required for the local market, this might be managed as a special and isolated case. True, the local partner might prove obstreperous in demanding a larger dividend pay-out and a lower rate of plough-back than the foreigner; he might even inquire from time to time about the formulas being used by the foreign partner to fix transfer prices or allocate central office charges. But difficulties such as these,

annoying though they might be, could be managed by the foreign partner if the local facility was not vital to the structure and strategy of his multinational system.

If less-developed countries were content to limit themselves to import-substituting manufactures alone, therefore, the foreign investors who had been persuaded to enter the market by way of a joint venture might well remain content with that form of investment. But the vanguard of the less-developed countries is plainly moving beyond this stage, and strong pressures are compelling the less-developed countries to interest themselves in the export of manufactured products. Part of the pressure comes as a result of the anticipated strengthening of regional trade groups, notably the Latin American Free Trade Area and the Central American Common Market. Part comes as a result of the growing realization of a need to expand the exports of manufactures to the markets of North America and Western Europe.

When the host government becomes eager for access to export markets, the foreign investor's negotiating position usually strengthens. At the same time, however, because the output of the local subsidiary no longer is to be confined to a limited, isolated market, the foreign investor's need for control sharply increases. At that point, therefore, it is not unreasonable to anticipate that the foreign investor will feel a new and heightened interest in establishing or reacquiring total and unambiguous control.

Manufacturing for export. The exports of manufactures from the less-developed countries to the markets of more advanced nations are increasing and diversifying rather rapidly. But they are still quite small in total quantity; and they must increase more rapidly still if the balance-of-payment constraint on economic growth is to be relaxed very much.

One view—to which I happen to be partisan—is that a more adequate flow of information between the less-developed countries and the advanced countries concerning market demand and production capabilities would represent both the necessary and the sufficient condition for a considerable rise in exports on the part of the less-developed countries. The kind of information flow needed to sell manufactured goods in the advanced countries is of a different order of detail and credibility than the information flow needed for the sale of raw materials; and the more sophisticated the product, the more the need for a credible and effective two-way information flow to market it.

Some countries have managed to generate the needed flow—Japan, Taiwan, Hong Kong, Turkey, Israel, and Mexico, are the outstanding

cases. Various devices have been used: Japan has provided elaborate subsidies for market information and market contact, underwriting some of the costs not only of Japanese exporters but also of foreign importers; Hong Kong, Taiwan and Israel have used trade channels whose efficiency may have depended in part on the special personal ties of their businessmen abroad. Many countries have relied on the relationship between local subsidiaries and foreign parents, thus internalizing the information flow within the corporate group; in such cases, company groups like Ford, IBM, Phillips, ITT, Olivetti and others have provided the conduits to support the flow of credible information.

Would such conduits be as effective if the enterprises in the less-developed countries, instead of being wholly-owned subsidiaries, were joint ventures or co-production enterprises or were simply managed under contract by a foreign manager? My guess is that the wholly-owned subsidiary will be preferred. That preference may be weak if the sales of the enterprise are to be confined to small regional markets, but it is likely to be stronger if the major markets of the foreign parent are involved. The problem that this preference presents for the less-developed country is less than formidable with regard to simple standardized manufactures, such as sewing machines, barbed wire, grey cloth, or frozen shrimp. But for more complex products, involving quality control, adaptation to market, etc., the bargaining position of the less-developed country may be very much more difficult.

On the Avoidance of Tension

At the very onset of a foreign venture in the less-developed countries, the parties confront the basic issue of the size and depth of the commitment. Surveying the possible alternatives, the prospective host country may well decide to forego some of the control it would like to have, in order to acquire the resources offered by the foreign investor, such as added capital or overseas markets. On the other hand, if the local enterprise can be operated with some independence of the foreign investor's interests in other countries, the foreign investor may willingly accept some initial impairment of control, such as the impairment implicit in a joint venture or a co-production agreement.

Whatever the initial position of the parties may be, however, there is a strong likelihood that the interests of each will change. On the host country's side, an initial willingness to forego control in the interest of securing needed resources is likely to be eroded. Either the foreign investor will have to provide new resources, such as more capital or technology or access to markets; or he will confront new demands by the host government for shared control; or

both will occur. On the foreign investor's side, the changing character of the local operation may suggest the need for more control as well.

There are two projections commonly made as to the outcome of these changes. One projection, popular among the less-developed countries, is that it is only a matter of time before foreign investors can be disposed of; another, popular among the investors, is that it is only a matter of time before foreign direct investment is accepted in the less-developed countries with tolerance and appreciation. If my analysis is correct, both projections are wrong.

According to the analysis, the position of the foreign investor will continually change, according to the external needs of host governments for capital, markets, and technology. Tensions will rise and fall in patterns that are partly predictable, reflecting the relative strengths of the parties concerned and the changing nature of their interests. However, the tensions could be reduced measurably if: 1) both parties were agreed that the initial arrangement would remain undisturbed for some fixed period of time; and 2) the termination date of the arrangement, while distant, was not remote. Agreements along these lines might well provide the investor with the prospect of the time period necessary to justify his initial commitment, while yet providing the host government with the option of reacquiring control at some tolerable future date. Agreements of this sort are not easily framed; among other things they have to provide for the contingency that renewal negotiations, when they become due, might break down, so that one would have to envisage a procedure that promised liquidation of mutual commitments on a reasonable basis. From a technical point of view, these problems can be difficult; but they are far from impossible. Here is a neglected opportunity for institution-building in the interests of economic development.

[Excerpted from "Conflict and Resolution between Foreign Direct Investors and Less-Developed Countries," Public Policy. Cambridge (Mass.): Harvard Graduate School of Public Administration, Vol. XVII, 1968, pp. 333-351.]

SUMMARY: SIZE OF PRIVATE
INVESTMENT FLOWS AND POLICIES
TO STIMULATE INVESTMENT

Foreign Affairs Division,
Legislative Reference Service
of the Library of Congress

[The flow of private investment funds to less-developed countries is encouraged in a variety of ways by the governments of the United States, Western Europe, and Japan. Among the capital-importing countries policy is not uniform, but most offer some kinds of incentives to attract investment.]

The importance of private investment as a means of transferring resources from developed to "less-developed countries" (LDCs) can be measured as the sum of: direct private investment into branches or subsidiaries of parent companies, or into jointly-owned ventures; portfolio investment—purchases of LDC securities; and medium- or long-term export credits extended from developed countries to cover sales of equipment. The net value (i. e., new disbursements minus repayments of earlier loans and repatriations of direct investments) of the flow of private investment from the principal capital-exporting countries, members of the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD), is shown in Table 1; this total does not include grants by private non-profit groups—foundations, churches—estimated at \$600 million in 1967, nor a small volume of investment from Finland, South Africa, and New Zealand. The totals have been increasing from some \$3 billion in 1956-64 to \$4.3 billion in 1967. These are very substantial sums although they are less than the totals for official government assistance from DAC countries in the same years. The trend of the last few years is for the private component to increase somewhat faster—though more erratically.

Table 1 PRIVATE FLOWS

The Net Flow of Resources from DAC Countries to Less-Developed Countries, 1956-67
(Bilaterally and through Multilateral Agencies)
in Million U.S. Dollars

| Countries | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|
| Private Capital | 2,998 | 3,779 | 2,917 | 2,820 | 3,182 | 3,213 | 2,579 | 2,544 | 3,287 | 4,293 | 3,973 | 4,329 |
| Australia..... | ... | 3 | 4 | ... | ... | ... | ... | ... | 15 | 15 | 11 | 15 |
| Austria..... | 4 | -4 | 5 | -8 | 6 | 18 | 17 | 4 | 7 | 14 | 13 | 9 |
| Belgium..... | 70 | 17 | 89 | 89 | 81 | 72 | 48 | 95 | 93 | 120 | 97 | 55 |
| Canada..... | 76 | 84 | 64 | 22 | 70 | 26 | 55 | 33 | 14 | 45 | 55 | 41 |
| Denmark..... | 2 | 0 | 0 | 8 | 32 | 25 | 7 | 1 | 21 | 2 | -2 | -3 |
| France..... | 477 | 410 | 453 | 337 | 477 | 463 | 418 | 391 | 529 | 547 | 575 | 513 |
| Germany..... | 275 | 248 | 243 | 474 | 274 | 221 | 182 | 167 | 284 | 255 | 252 | 594 |
| Italy..... | 91 | 45 | 82 | 65 | 193 | 177 | 284 | 216 | 188 | 178 | 510 | 82 |
| Japan..... | 53 | 40 | 53 | 99 | 137 | 275 | 199 | 127 | 174 | 242 | 384 | 465 |
| Netherlands..... | 232 | 122 | 161 | 169 | 203 | 144 | 49 | 97 | 69 | 169 | 160 | 114 |
| Norway..... | 1 | 0 | 3 | 2 | 0 | 18 | 0 | 1 | 6 | 27 | 4 | 15 |
| Portugal..... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 9 | 15 | 32 |
| Sweden..... | 12 | 13 | 23 | 27 | 40 | 44 | 19 | 31 | 34 | 35 | 51 | 61 |
| Switzerland..... | 92 | 67 | 71 | 116 | 153 | 187 | 156 | 197 | 101 | 196 | 107 | 118 |
| United Kingdom... | 384 | 727 | 392 | 467 | 474 | 442 | 324 | 306 | 426 | 547 | 419 | 377 |
| United States.... | 1,230 | 2,009 | 1,275 | 954 | 1,042 | 1,102 | 819 | 880 | 1,325 | 1,893 | 1,323 | 1,844 |
| Official Resources | 3,263 | 3,858 | 4,388 | 4,329 | 4,930 | 6,029 | 5,950 | 6,072 | 5,856 | 6,200 | 6,498 | 6,977 |
| Total Resources | 6,075 | 7,637 | 7,305 | 7,148 | 8,112 | 9,241 | 8,529 | 8,616 | 9,143 | 10,493 | 10,471 | 11,306 |

Source: OECD, Paris (Development Assistance: 1968 Review, pp. 255-257).

United States Government Programs for Encouragement of Private Investment in the LDCs

Congress has encouraged private investment abroad as part of the foreign aid program ever since the Economic Cooperation Act of 1948. Since that time, investment guarantees have been broadened. The guarantees against inconvertibility, expropriation, war, revolution, and insurrection constitute the specific risk guarantee program, under which over \$6 billion worth of insurance had been issued by 1968. Special programs also cover losses on loans made for housing mortgages in Latin America, losses on loans for credit unions, and 75 percent of the loss arising out of such other risks as the President may determine. This last provision, which covers practically all commercial risks except fraud and misrepresentation, is generally known as the extended risk guarantee program.

The U. S. Government also attempts to encourage private foreign investment by providing for the partial financing of investment surveys by the Agency for International Development (AID). Under Public Law 480, local currency generated by the sale of U. S.

agricultural commodities may be loaned to U. S. private investors and to foreign companies, to facilitate the distribution, utilization, and commerce in such commodities. As of the spring of 1967, \$101 million in local currencies was available for investment under this program in 18 countries.

Both AID and the Department of Commerce provide a variety of informational services to potential foreign investors. AID maintains a "Catalog of Investment Information and Opportunities," containing general information on the investment climate and opportunities in the LDCs, including data on capital required, potential markets, projected annual sales, location, manpower required, etc. Existing tax law provides that the President is to accelerate the program for negotiating treaties of commerce and trade, including tax treaties, to encourage the flow of private investment and its equitable treatment in countries aided under the Foreign Assistance Act.

Promotion of Private Investments in the LDC's by other Industrialized Countries

After the United States, the major sources of direct private investment in the LDCs are the United Kingdom, France, and West Germany, followed by the Netherlands, Italy, and Japan. It appears that West Germany is the only one among these countries that has adopted investment incentive measures that compare in variety and in resource backing to the program of the United States.

Most of the investment incentive measures that have been adopted by other industrialized countries are similar to those in the U. S. program, although a few countries offer some forms of encouragement to their investors that are not yet available to U. S. investors. For example, public or semi-public development corporations and banks in the United Kingdom, France, West Germany, and Japan undertake equity investments in the LDCs in partnership with domestic investors from the private sector, and extend loans to domestic companies investing in the LDCs. West Germany and Japan provide special tax relief for private investors in the LDCs.

The investment incentive measures of some countries apply only to certain LDCs. Thus, the activities of some investment promotion institutions in the United Kingdom and France are concentrated in Commonwealth countries or French-speaking Africa south of the Sahara, while Southeast Asia and South Korea are areas of special interest to Japan.

As of 1966, five countries other than the United States had investment guarantee schemes which covered varying categories of political risk in the LDCs; namely, Australia, Denmark, Germany,

Japan, and Norway. The United States is the only country that provides any guarantee against commercial risks for investments in the LDCs. Belgium, the Netherlands, and Switzerland have had investment guarantee schemes under consideration. Since 1964 Austria has provided insurance against political risks for investments that have been made in connection with, or as a result of, exports of goods and services by Austrian firms. In 1966 France began a limited guarantee program similar to Austria's that makes guarantees available only for equity investments made in connection with the export of capital goods. As of August 1966, Canada, Italy, Sweden, and the United Kingdom did not have any investment guarantee schemes.

The United States leads the industrialized countries in the conclusion of bilateral investment promotion and protection agreements with the LDCs. Partly because Germany usually makes the existence of such an agreement the condition for the extension of investment guarantees, that country also has concluded a fairly large number of investment protection agreements—reportedly 30 by the end of 1965. The only other countries that had concluded a significant number of such agreements with the LDCs by the end of 1964 were Switzerland and Japan. The United Kingdom and the Netherlands had concluded one and two such agreements respectively.

Most developed countries have devised special methods for taxing income from direct investments abroad that involve various degrees of recognition of foreign taxes paid. After a detailed study of these methods, the OECD's Fiscal Committee pointed out that, even when the most generous tax treatment is accorded to foreign income, the aggregate tax burden of a foreign subsidiary in an LDC may be greater than that of a domestic subsidiary. As far as can be determined, only West Germany and Japan single out investments in the LDCs for special unilateral tax relief to make such investments more attractive to their investors. Special tax relief for West German investors in the LDCs was provided in a development assistance tax law which came into effect in January 1964. Japan has provided special tax relief for Japanese investors in the LDCs since 1964. Neither the United Kingdom nor France has adopted unilateral tax measures to promote foreign investment in the LDCs. France, however, has negotiated a number of bilateral double-taxation agreements which include tax concessions for such investments. The United Kingdom, on the other hand, has recently withdrawn some tax concessions previously available to investors abroad, and has enacted new tax measures that will probably act as disincentives to investment in developing countries (for balance of payments reasons).

As of May 1965, Sweden led the capital-exporting countries in the number of double-taxation agreements concluded with the LDCs (25), followed by Denmark, the United Kingdom, and the United States (17 each), France (16), Canada and Norway (13 each). Other capital-exporting countries, including West Germany, had concluded, on the average, only four such agreements. By far the greater number of these agreements were concluded with the newly independent nations of Africa south of the Sahara. In Asia, India and Pakistan each had concluded about nine such agreements with capital-exporting countries. In all of Latin America, only two double-taxation agreements with capital-exporting nations were in effect in May 1965.

The United Kingdom, France, West Germany, and Japan support, directly or indirectly, some form of assistance to private investors in the way of surveys or notification of investment opportunities in developing countries. Public or semi-public corporations or agencies finance or conduct feasibility studies and sometimes seek out investment opportunities in connection with their functions of lending to private investors or of undertaking equity investments in partnership with private investors. Members of the European Economic Community (EEC) contribute to the EEC's European Development Fund (EDF) and European Investment Bank (EIB), which extend loans and grants to finance projects in the African states associated with the Community and in dependent territories of members of the Community.

The West German Government circulates information on specific investment opportunities through its Federal Foreign Trade Information Office as well as through the Federation of German Industry, and provides some financial support for the information activities sponsored by the Federation of German Industry and other trade and banking groups. The French Government set up a Consultative Industrial Committee in 1963 which meets several times a year and alerts French industrialists to investment opportunities in French-speaking Africa. The British Government apparently does not directly sponsor any comparable information services for prospective investors in Commonwealth or other developing nations. Japan, through its technical cooperation program, provides experts to analyze the prospects of investment projects in a number of LDCs and to suggest new industries which might be promoted. These experts report directly to the governments of the LDCs concerned, and the advice that they offer indirectly paves the way for undertakings by Japanese private investors.

France, West Germany, and Japan finance in part or in whole credits extended by government or commercial financial institutions to private investors undertaking ventures in the LDCs. In France, such investment credits are extended by the Caisse Centrale de

Cooperation Economique. In West Germany, credits for small and medium-sized firms investing in the LDCs are available from modest Government funds administered by the Kreditanstalt fur Wiederaufbau. Japan's Export-Import Bank and Overseas Economic Cooperation Fund both extend credits to Japanese private firms investing in the LDCs. Other countries granting some form of direct financial assistance to private companies undertaking projects in the LDCs are Austria and the Netherlands.

In addition, public or semi-public development corporations or banks in Great Britain, France, and West Germany include undertakings in partnership with private investors in the LDCs, and support projects that serve to attract private capital. They participate directly in joint ventures with private investors; they help to finance public development corporations in the LDCs which, in turn, may undertake projects in partnership with private investors from the industrialized countries and with such international or regional institutions as the World Bank and the European Development Fund. Great Britain's Commonwealth Development Corporation and Commonwealth Development Finance Company, and the Caisse Centrale de Cooperation Economique of France have been active in the less-developed world for 15 years or more, concentrating their activities originally in the dependent territories of Great Britain and France, and subsequently in those LDCs remaining associated in one way or another with these two countries. Since its establishment in 1962, West Germany's German Development Company has emphasized equity investments in partnership with small and medium-sized German firms and their counterparts in the LDCs.

Incentives Offered by the LDCs Themselves to Private Investors

Governments of the LDCs vary widely in their attitudes and policies toward foreign private investment. Some, such as Burma and Syria, generally prohibit foreign private investment. Others have varied in their policies depending upon the government in power. Nevertheless, a large proportion of the LDCs seek foreign investment, especially in the manufacturing field, and have designed incentives to attract investors.

These incentives can be classified under the following headings: capital and profit repatriation, tariff and import incentives, tax concessions, assurances with respect to expropriation, and investment guarantee agreements.

A common incentive offered by the LDCs is the guarantee of capital and profit repatriation. A few countries, which have no substantial balance-of-payments difficulties (Venezuela and Mexico for

example), allow repatriation without restriction. Usually, however, repatriation is governed by foreign exchange controls. Pakistan permits the repatriation of capital to the extent of the original investment, but subjects the remittance of profits to existing regulations. Thailand links both capital and profits to exchange controls, while India grants the remittance of profits but generally allows capital repatriation only after a period of 10 years.

Tariffs often provide investors with protection against imports of competing products, while tariff reductions on the initial import of plant and equipment, and sometimes on imports of raw materials and components, provide additional incentives. Venezuela imposes high tariff and quantitative restrictions on imports that compete with local industries; Colombia and Mexico even prohibit the importation of certain competing goods. Thailand, Pakistan, and India provide similar concessions through both tariffs and import licensing requirements, while Iran employs high tariffs, outright bans, and licensing.

A number of the LDCs have adjusted their tariff laws to allow private investors to import more easily the plant and equipment needed to set up manufacturing facilities and the raw materials and components essential for continuing operation. Chile has removed tariffs on both equipment and raw materials in such cases. Mexico provides reduced tariffs on specific types of equipment, while Thailand has withdrawn duties on initial imports of machinery, plant, and equipment.

Many countries offer tax concessions to foreign manufacturers, mainly in the form of tax holidays on corporate tax payments. They vary widely from country to country. Pakistan exempts new industrial undertakings from corporate taxes for two to six years, depending upon location of the plant. Pakistan also reduces the tax rate on profits derived from exports as an incentive to sell abroad. Mexico extends tax holidays for up to 10 years, Malaysia regulates its five-year exemption period on the basis of the amount of investment in buildings and machinery, and Venezuela grants concessions or reductions to existing firms which expand their plant facilities.

Most of the LDCs that seek foreign private capital have issued assurances regarding expropriation, usually in the form of a statement that the government does not intend to nationalize foreign firms but that, should an occasion arise when nationalization becomes necessary, it will pay just compensation. Several of the LDCs have incorporated such declarations into law.

Nearly every government of Asia, Africa, and Latin America tailors its investment policies to favor joint venture arrangements between foreign firms and local entrepreneurs. Many firms see

distinct advantages in association with local concerns. Some businessmen, however, believe that the extent of their contribution to a project entitles them to majority ownership and with it decision-making power. Several examples may be cited of governments which maintain a policy of local majority control. India and Iran have favored it in most cases, and Mexico requires it in a number of fields.

The size of an LDC's public sector influences the opportunities for investment. Potential foreign investors are wary of establishing facilities that will compete with government-owned enterprises. Certain industries may be reserved solely for the government. For instance, the Mexican Government maintains a tight monopoly of the production of petrochemicals and controls all consumer goods distribution and warehousing. India places 17 industries in a category set aside exclusively for the public sector, and lists 12 industries in which the state will take the initiative in establishing new undertakings, but in which private enterprise will supplement the public sector. Most LDCs, however, allow the private sector a wider scope of activity, and have set up industries only when private initiative has not been forthcoming.

[Excerpted from the Appendix of "The Involvement of U. S. Private Enterprise in Developing Countries," Report of the Subcommittee on Foreign Economic Policy of the Committee on Foreign Affairs, House of Representatives. Washington (D. C.): U. S. Government Printing Office, 2 April 1968, pp. 44-54.]

ATTRACTING INVESTMENTS: A MARKETING PROPOSITION

Yair Aharoni

[The author, starting with an investigation of why American businessmen did or did not invest in his country, extended his research to cover U.S. foreign investment decisions generally. The chapter of his book excerpted below mobilizes his findings from the standpoint of any country desiring U. S. private investments, with conclusions applying to investments from other sources as well.]

Let us assume that the government of a country:

1. Desires to attract United States investors and is willing to aid such investors. We assume that it knows the types of investments it is interested in attracting.
2. Searches for methods of attracting foreign investors which will be both effective and efficient.
3. Possesses or is able to hire competent personnel to guard against international carpetbaggers and fast-buck operators.

We recognize that this set of requirements is quite formidable, and many less developed countries do not in fact possess all the required knowledge to screen foreign investments. The following, therefore, may be read as a market research report for governments, as a way of making "sales" if the government wishes to do so, and not as an attempt to prescribe national policies.

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A Marketing Strategy

A program for attracting United States investors should be very similar to one for marketing a new industrial product. It necessitates a carefully planned and well-balanced marketing strategy, based on the "consumer's point of view." As such, it should acquaint the consumer with the product; in this case, the investor with the foreign country. First and foremost, it should be aimed at creating a decision to look abroad. It should supply up-to-date, accurate, and adequate information, and counteract or neutralize the basic apprehension of uncertainty. Not only should it deal with generalities, but it should also suggest concrete projects for consideration. Preaching the importance of American investments to the less-developed economy is rarely sufficient to convince businessmen to go ahead and invest in such an economy, unless the advantages to business of such investments are sufficiently demonstrated. The program also should help prospective investors in carrying out their investigations and be aimed at reducing the subjective probability of risk and uncertainty. Above all, the program should be well-integrated and should encourage the investors throughout the entire decisions process and beyond it.

Creation of a Good Image

Less-developed countries are considered by American businessmen to be unstable, and their governments unreliable. These governments should do their utmost to create a better image of themselves in the eyes of prospective investors. This calls for a continuous public relations effort, aimed at building a good image of the country, its stability, and its economic development, and at creating confidence in the ability of its government.

Public relations campaigns, however, will not succeed unless the government actually tries to behave according to the image it is trying to create. Confidence is hard to gain and easy to lose. Thus, the nationalization of foreign oil companies in Mexico (1938) had a strong adverse effect on the flow of American investment to that country for a long time. The Mexican government had to work hard to restore investors' confidence.

Suggestion of Projects

Most American businessmen do not look abroad for investment opportunities. Even when they do, they have to rely on crude benchmarks: the size of existing industry may be small, the population may not be large and its standard of living low, and so on. The American businessman will not commit the management time and the capital for a detailed evaluation of a country which has not passed

the benchmark test in order to discover good prospects for investment. There is no doubt that opportunities for profitable investments in less-developed countries do exist, but generally the American businessman will not find them, simply because he does not look for them.

Therefore, governments wishing to attract American investors should not rely on the American entrepreneur to initiate a project. They should make a continuous effort to discover projects suitable to the conditions of their countries (and balanced with their general development programs) and make such projects known to prospective investors in the United States. Such studies may be carried out, for example, by 1) a careful study of local market opportunities, 2) an intensive appraisal of import data to detect trends which might point toward successful industrial ventures in the near future, 3) a determination of the requirements for components and supplies of new enterprises which could be provided by existing and new enterprises, and above all 4) a careful analysis of the comparative advantages of the country and the finding of products and production processes which are the most suitable for its conditions.

As a result of such investigations, the government should initiate and finance the preparation of feasibility studies that would give sufficient details on the project (such as the size of the market, growth potential, costs, etc.) to arouse interest in it. These feasibility studies should be brought to the attention of American businessmen.

Many objections may be advanced against the suggested scheme. They are: 1) that preparation of feasibility studies is an entrepreneurial function that should not be undertaken by government; 2) that less-developed countries lack the competent personnel to do this type of work; 3) that the government, by preparing a suggested project, takes too much responsibility and will be blamed in case of a failure; and 4) that American businessmen may be reluctant to rely on government-prepared figures.

As to the first objection, this is partly a fundamental question of outlook and moral philosophies. Our field research clearly points out that the lack of information and the cost of investigation block United States investments in less-developed countries. There is no reason why governments should not stimulate the creation of new enterprises as long as the investment decision is left to a private entrepreneur.

The second objection is more serious. It is suggested that funds from the intergovernmental aid programs be devoted to the implementation of such projects, i. e., that independent foreign experts be hired under the auspices of the technical aid programs to do this kind of work. This will also answer the fourth objection.

As to the third objection, the danger that the government will be blamed in case of failure can easily be avoided (or minimized) if it is made clear from the start that the final decision and the final responsibility rest in the prospective investor's hands.

Reducing the Cost of Investigation

The cost of investigation is a barrier to investment abroad. The government feasibility studies will not, and should not, alleviate the need of the investor for a detailed, on-the-spot investigation. The host government, however, may help here by sharing part of this cost.

At first glance this proposal may seem strange. However, this type of subsidy has been employed—apparently quite successfully—by Puerto Rico. At the present time the United States Agency for International Development (AID), under its Investment Survey Program, pays up to 50 percent of the cost of approved surveys to study the feasibility of private investment in less developed friendly countries. If the firm decides to invest, it is expected to pay AID back. If it rejects the opportunity, AID is not reimbursed for the cost. By its very nature, however, this aid is given only after the businessman's decision to look abroad has been made.

Government Help in On-the-Spot Investigation

An added measure to attract United States investors is the creation of some central body which would help investigators while they are in the foreign country. Such a body should aid the investigator in getting information, in arranging meetings in advance, in clearing the fog of red tape, etc. Judging from the field research, we would also recommend that such an office help the investigator in his personal affairs. For example, a representative of such an office may meet the investigator in the port of entry, help him through the customs office, arrange suitable hotel accommodations, and in general treat him as a guest.

To avoid any impression of bias, such an office might be a joint venture of the government with private business associations or with an Industrial Development Bank.

Other Ways to Reduce Uncertainty

These four measures—a public relations program, preparation and "sale" of feasibility studies, reduction of investigation costs, and help to the on-the-spot investigator—if executed efficiently and in a well-coordinated manner should help to bring about the decision to look abroad; to shorten the long and tedious process of investigation;

to reduce uncertainty by supplying adequate and reliable information. It is our belief that such policies will materially increase the flow of United States investments to less-developed countries, and that the benefits accrued from the added investment will be found to exceed their cost. However, in many cases of less-developed countries, the uncertainties involved are so great that these measures alone will prove insufficient. Foreign governments will have to find ways for a further reduction of uncertainty. The following may be suggested as examples of such policies:

1) Government loans: One way of reducing the impact of risk is by reducing the amount of capital needed to be invested. A local currency loan, first, reduces the uncertainty of exchange. Second, it minimizes the amount of equity capital committed by the company and, therefore, reduces the impact of risk. Third, the loan is given at the start of operations and thus does not involve any uncertainty as to the reliability of government promises. Finally, a capital structure with a high debt to equity ratio will often give the entrepreneur a better return on his equity investment. It is, in our opinion, one of the best (if not the best) forms of aid government can give to foreign investors.

2) Accelerated depreciation with guaranteed loss rebate: Accelerated depreciation is effective not only because of the income tax saved, but also because it shortens the pay-out period, a yardstick often used by businessmen to evaluate investments. The main disadvantage of this measure, however, is the fact that because profits are uncertain, the businessman cannot be sure that he will be able to utilize accelerated depreciation. To overcome this weakness, it is suggested that the foreign government give a "loss rebate" to the extent of the depreciation: if the firm does not make enough money to cover the depreciation, the treasury of the foreign country will not give it a carry-over credit, but will actually reimburse it for the loss to the extent of the depreciation. If this admittedly unconventional method is used, the risk of loss as well as the uncertainty will be sharply reduced.

3) Other guarantees: Other ways of guarding against uncertainty and risk may be devised. For example, the foreign government may guarantee that it will not change the rate of taxation for a certain period of time or may guarantee tariff protection. In devising such types of aid, the government will have to weigh their impact on the American investor against the cost to the government, including the cost in reducing its degree of freedom in action.

4) Additional concessions: In some specific cases, a government may find it necessary to grant more concessions and help than outlined above. In such cases, the field research has shown that

additional concessions that reduce the size of investment, the cost of capital, and the cost of production, in that order of importance, will be the most effective. Concessions which affect profits alone, and are dependent on the availability of profits, are the least effective. We would, therefore, not recommend their use.

"Servicing"

It would be a severe mistake to look at the task of attracting investors as a one-shot proposition. "Servicing" is important for many reasons. First, investors may lose interest in the investment when they encounter too many administrative problems after they invest. Second, satisfied investors—like satisfied customers—may "recommend the product to other customers." Third, satisfied investors will expand their investment and may also invest in new ventures in the same country. Thus, the help given by the host government should not be stopped once the foreign investor has built his enterprise.

This does not mean that the government should continuously interfere in the operations of foreign enterprises; the final responsibility for the success of a business enterprise rests with the owners and managers alone and not with the government. In order to help the owners perform managerial functions, the government should adopt such measures as cutting the red tape involved in obtaining government licenses and permits which are considered essential, and by supplying adequate general economic information. It goes without saying that the government should always keep its promises to such investors as long as these investors keep theirs. When a government imposes conditions as a part of an approval, it should make sure it has vigilant watchdogs to guard against misuses and abuses of this approval by the investor.

Preventive Actions

One situation which destroys the confidence of American investors in the possibility of investment in foreign countries is the activity of fraudulent promoters. In a democratic system it is hard to prevent such activity. The government should, however, do its best in this direction by enacting measures similar to "blue sky laws" and by initiating and developing a good information service on prospective partners.

Income Tax Exemption

One seemingly startling conclusion we reached is that the granting of income tax exemption by host governments is not an important factor in foreign investment decisions. Income tax exemption is

today the incentive most widely used by governments in trying to induce direct investments. We claim that this incentive does not achieve the results expected, that it should be discarded, and that other, more efficient incentives should take its place. Still, many may argue that the very fact income tax exemption is widely used is prima facie proof of its validity.

Theoretically, income tax exemption is a form of subsidy granted to investors in a field of economic endeavor the government would like to promote. Governments hope that by granting such subsidies they will attract investors who would not invest otherwise. Clearly, it is inefficient to grant a subsidy to investors who would have invested even without it. The higher the number of beneficiaries of the subsidy who would have invested without it, the lower its efficiency. If a government spends a large part of its resources on ineffectual subsidies, it may not have resources left to promote other important economic endeavors.

Assuming that the policy of the United States government toward taxation of investors in less-developed countries does not change, income tax exemption would increase the profits after taxes of the investor. But our investigation indicates that investors primarily wanted to avoid loss (both of capital and management time) and uncertainty, and were not attracted by an inducement that is a function of profits. Investors also saw high cost in terms of loss in managerial freedom of action in obtaining the tax exemption.

Similar conclusions about the inefficiency of income tax exemption—although not for the same reasons proposed by us—were reached by Ross and Christensen. These authors asked a sample of United States investors in Mexico: "Would you have started business without the availability of tax exemption?" Fourteen respondents answered, "definitely yes;" nine—"probably yes;" one—"probably no;" none of the respondents said he would "definitely not" have invested. Ross and Christensen also report that each of the 150 companies denied exemption with respect to 160 products between 1951 and 1955 proceeded to produce these products without the benefit of tax exemption. These findings are certainly in line with our description of the decision process and the commitments created through it.

Harry J. Robinson surveyed the motivation of private foreign investment:

One of the most important findings is the difference between what businessmen and governments regard as major factors influencing decisions to invest. Foreign investors consider the five government policies most favorable to foreign investment to be:

1. Establishment of and firm adherence to a national development program.
2. Favorable terms for the transfer of profits and repatriation of capital.
3. Non-discrimination against foreign ownership and control.
4. Equality of treatment with domestic enterprises.
5. Freedom from detailed or burdensome regulations or organization ownership and management.

It is significant to discover that only two of these items were included by most of the twenty governments in their evaluation of the five most important incentives they offer to the foreign investor:

1. Tax relief offered to new enterprises.
2. Equality of treatment with domestic enterprises.
3. Progressive domestic climate.
4. Transfer of profits and repatriation of capital.
5. Government-sponsored credit institutions.

[Excerpted from The Foreign Investment Decision Process. Boston (Mass.): Division of Research, Graduate School of Business Administration, Harvard University, 1966. Chapter 9, pp. 221-231 and 234-238. Reprinted with Permission.]

ECONOMIC DEVELOPMENT, PRIVATE FINANCE AND THE INTERNATIONAL FINANCE CORPORATION

Martin M. Rosen

[The International Finance Corporation stimulates the flow of investment funds to developing member countries by joining in the financing of appropriate ventures. Increasingly it is evolving more complex deals, and looks toward the development of truly multi-national corporations.]

One of the important facts about the future of economic development is that in many places much of the hope for further progress must now be based on increased private investment. The major providers of publicly financed assistance are restraining, some of them reducing, their aid to the developing countries. If we go back a decade, in the five years 1958 through 1962, assistance provided by the governments that are members of the Development Assistance Committee [most of West Europe, United States, Canada, Japan] rose by just over 36 percent. In the most recent five years the increase was less than half as much—15 percent. In many countries, there are international payments problems that inhibit flows of governmental funds abroad.

These factors create a tendency for greater reliance to be placed on private enterprise in keeping up the flow of capital to the developing countries. But even without such impediments, there would currently be a call for substantially increased participation by the business community in the development effort. During the past two decades, funds supplied by governments and intergovernmental agencies have been used

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to make many fundamental improvements in the infrastructure of the developing lands. In many areas, electric power dams have been built, roads and other communications improved, education broadened, the health of the labor force strengthened, and irrigation and other basic improvements have been made to agriculture. Economic growth must in the future stagnate in such places unless upon this new infrastructure there is now built a superstructure of facilities for the production of useful and needed goods and services. By its nature, Phase One of development work is financed, as, indeed, infrastructure building has almost always been financed, out of the public purse. Just as surely, Phase Two, which is the building of productive enterprise upon the underlying infrastructure grid, is typically, and best, financed and managed by the private sector. It is in this context that we in the International Finance Corporation (IFC) look forward to substantially expanded opportunity for sound investment of private capital over the entire range of useful private enterprise in the less-developed countries.

Chief among the criteria for our investments are the following basic rules: we invest in the less developed of our member countries, where sufficient private capital is not available on reasonable terms; we invest in projects of economic priority to the host country, and where there is a reasonably prospect of profitability appropriate to the risks being taken; and we invest where IFC is needed and can make a constructive contribution. Experience has led us to a further basic rule: in financing enterprises in the developing countries, the most effective structure is one in which local finance and management is combined with foreign finance and management.

I am stressing here the importance we assign to flexibility in applying basic criteria. But we believe there is no room for flexibility in the matter of competent management. The need for sound management will not be overcome by any amount of finance, nor by a rich market, abundant and cheap materials, good labor supply, good location, and so forth: bad managers can easily overcome any of these advantages, and some are versatile enough to overcome them all. On the other hand, good management can surmount considerable difficulties, when the basic situation is viable.

Many proposals come to us in which a foreign know-how partner is willing to undertake management responsibilities, but is not also willing to take an equity stake in the venture. Our attitude to such a proposal is negative. It is simply our experience that you get better management performance when those responsible for it get the rewards for success and suffer the losses of failure. I know there is difference of opinion in this matter. We would not absolutely rule out the consideration of a proposition not involving equity

participation by the foreign management sponsor, and we have made such commitments on this basis. But we are very reluctant to proceed where the know-how partner does not make an equity investment.

We prefer also that there be a local private partner in the venture who, like the foreign entrepreneur, should have an equity stake in the joint venture. However, there are cases in the developing countries where this simply is not possible. One case was the \$60 million copper mining project in Mauritania, to which IFC committed \$20 million last May. The private sector in Mauritania does not yet have the capital, or the management capacity, to enter into such a venture, so we departed from the rule here rather than let the project fall through. The Mauritanian Government became a shareholder, representing the local interest, in a financial plan in which the largest shareholder, and the management sponsor, was Charter Consolidated of London; other share capital was provided by IFC and four French companies. Where necessary or desirable we will accept a government directly or through governmental agencies as a shareholder, but we do not want to be the largest shareholder and we insist that the company be predominantly private. The governmental interest should be no more than 25 percent.

Most IFC investments are in manufacturing industries. But in the last few years, we have also committed funds to services—including utilities, tourism, storage and warehousing facilities—and to agriculture. We are diversifying, and we stand ready to consider investment in virtually any type of productive private enterprise that is of economic priority in the developing countries and which has good prospects of profitability. We are steadily diversifying geographically, investing in new countries; at the end of fiscal 1968, commitments in Asia totaled 24 percent of IFC's cumulative investments, those in Africa 22 percent, Latin America 48 percent, Europe and Oceania 6 percent. Last year, over half our new commitments went to Africa.

New Role

In the conditions surrounding investment in the developing countries, potentially sound investments may not get out of the planning stages for many reasons other than lack of finance. Consequently, promotion of prospective investments into reality has always been part of our job, and we have given this help in the form of a wide range of advice and technical help. Last July, we decided to take on a more promotional role. In those cases in which we feel that good projects suitable for IFC financing could be developed, but where they are not moving forward because of the absence of an industrial sponsor committed to the project, IFC would act as a *banque d'affaires*. We would provide limited amounts of money for the costs of

putting a deal together, including some of the costs of feasibility studies. If the project goes forward, IFC's expenses on behalf of its promotion would be capitalized as part of our investment in the new venture.

We have also decided that as part of this promotional activity we could join in the equity of pilot companies, together with other members of an investment group interested in backing one prospective full scale company. This embryo company would then carry out the necessary detailed studies and negotiations needed to implement the project. If the project proceeds, the equity investors in the pilot company would be reimbursed, usually by having an investment in the full scale company. We have already started activity in this area, and we have agreed to join pilot companies in Honduras and in Colombia, and we are engaged in the *banque d'affaires* role in Indonesia.

A Look Toward the Future

The future of development seems marked not only with the general need for increased participation by private capital that I have already mentioned, but some of the more promising possibilities would appear to hinge altogether on production and management know-how, on access to scattered resources, and on the marketing abilities, that reside only in the private sector. Over the past few years, we have been sharpening the skills IFC will need to give assistance to development investments that combine the high technology and the multinational management skills with the financial resources and the intergovernmental knowledge that the modern investment requires. We have been gearing up to meet these tests by increasing the size of our investments, by helping to bring together increasingly complex investment groups and, perhaps most important, by development of a growing range of flexible responses to widely varying development investment situations.

Another important element is the growth of the multinational—as distinguished from the merely international—corporation, that seems to me to be one of the current trends with the strongest implications for the future of economic development. This new type of company operates not merely as marketer in one place of goods produced elsewhere. On the contrary, it operates on a truly integrated basis, with responsibilities to shareholders both where it produces and where it markets. Investment carried on in this way gets away from the disadvantages of the dichotomies of developed-less developed, the agricultural-industrial, the great and the small, so burdened with the past. It becomes a viable business procedure standing squarely upon the best assurance that the entrepreneur has ever had: the profit motive. Such a business is multinational, in the sense

that it is not merely present in more than one country, but that it is part and parcel of more than one country.

It is in the creation and promotion of this sort of multinational joint venture that I see an important future for the work both of the International Chamber of Commerce (ICC) and the IFC. IFC is a multinational investor par excellence. ICC is an international organization that would be highly important for the future if it did nothing more than to bring together the international corporations that make up its membership. The task forces that you in the ICC have at work indicate that you are engaged in the serious business of working out the legal and institutional bases for the operations of the multinational corporation. IFC, meanwhile, is practicing the art of putting together, out of the materials of existing multinational and international corporations, in combination with national enterprises in the developing countries, new enterprises that start life as multinational companies.

[Excerpted from a speech presented to the International Council of the International Chamber of Commerce, Paris, 4 December 1968, pp. 3-15.]

EDITOR'S NOTE: Facts about the International Finance Corporation

As of December 31, 1968, the IFC had committed \$289 million of its own funds to 123 private enterprises in 39 countries, of which \$196 million had been disbursed. Other investors had put well over \$1 billion into these projects; in many cases IFC's contribution had closed a gap in the available financing of a project, making possible what might otherwise have been unattainable. IFC initial commitments range from \$500,000 to \$20 million, except for its commitments for promotional costs where the upper limit is \$50,000. All its investments are made in association with private business. IFC finances specific projects, but does not engage in direct financing of imports or exports. In addition to mobilizing capital for new ventures, IFC also sells off its investments to private buyers when opportune. Of the Corporation's gross commitments of \$289 million, about \$120 million have been sold to other investors; the 30 investments so far closed out by IFC have yielded an annual average return of 11.1 percent.



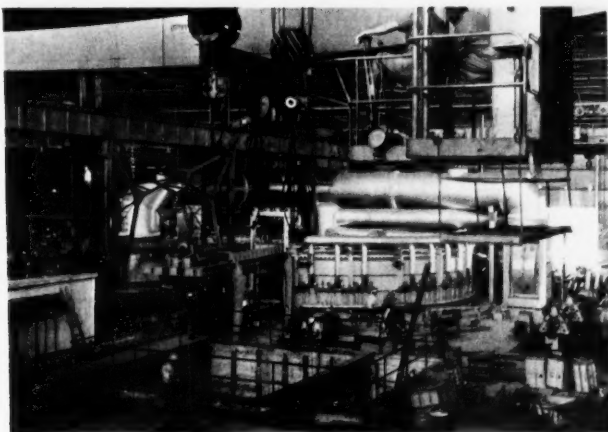
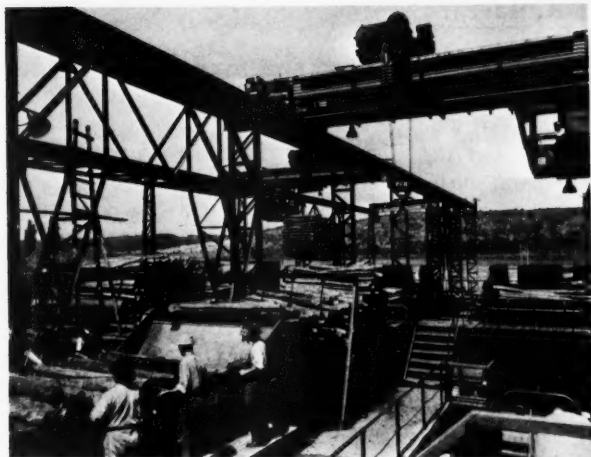
Three plants financed by
the International Finance
Corporation:

Top: Fertilizer factory
in Senegal;

Left: Chemical pulp
plant in Chile;

Bottom: Steel Mill in
Brazil.

(Photos: World Bank)



NEW APPROACHES TO PRIVATE OVERSEAS INVESTMENT FOR DEVELOPMENT

Paul Streeten

[Changed conditions since the 19th century call for flexible approaches to foreign private investment. Joint ventures, mixtures of loans and equity, and other aspects may help avoid difficulties.]

The Need for Rethinking

Much of our present thinking and many of our institutions are still dominated by the experience and the doctrines of the 19th century, and are therefore ill-adapted to the altogether different circumstances and needs of the second half of the 20th. There are a number of features which distinguish modern private foreign investment from that in the last century, some of which have been elaborated by Professor Rosenstein-Rodan.

First, whereas in the 19th century 70 percent of world foreign investment took the form of bonds and only 30 percent that of equity, today bond investment is very small and disregarding trade credits the majority is in equity. This implies that the rates of return and the services rendered have changed. Whereas equity investment carries a yield of 15-25 percent before tax, and 10-15 percent after tax, fixed interest investment in spite of current high levels of interest rates yields only 7 percent. [Note: If long term amortization is included along with interest, the current payments by borrowers are about the same level as 10-15 percent annual equity earnings.] The

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higher returns on equity investment reflect partly remuneration for technical and managerial know-how, partly a risk premium on various kinds of risk and partly monopoly power.

The second difference is that equity investment in the 19th century carried the risks of cyclical fluctuations. In bad years no dividends would be paid out. Such fluctuations are less important today and there is, therefore, less justification for a reward for this kind of risk-bearing.

Third, as a result of the more rapid spread of knowledge, certain, although by no means all, types of technological knowledge are nowadays much more widespread and standardized than they were in the 19th century. It is frequently cheaper to hire foreign engineers and to borrow capital at fixed interest rates than to encourage equity investment. There are other industries, however, in which technical and managerial know-how is not so readily available and where high returns may be justified.

In addition, international trade has ceased to be as effective an "engine of growth" for the developing countries as it was earlier. 20th century technical progress has been successful in producing substitutes for primary products and economies in the use of raw materials. Moreover, industrial countries' demand has shifted away from products requiring large proportions of imported raw materials. Finally, protection in advanced countries has also greatly reduced the scope of underdeveloped countries to earn foreign exchange by increasing their traditional exports. Whereas growth in the more advanced countries stimulated expansion in underdeveloped countries in the 19th century, today such growth has very much smaller effects and may sometimes be actually detrimental to development. Further, what is regarded as an acceptable rate of growth in underdeveloped countries was previously substantially less than it is today. As a result of this, there has been a growing disparity between development aspirations and trade opportunities.

Lastly, in the 19th century the inability to earn profits and repay debt used to lead to bankruptcies, which relieve debtor countries of the need to repay capital. The effective rate of return has therefore always been much smaller than would appear on paper. Today bankruptcies are much rarer, and default is considered a much more serious matter. This implies that softer terms should be recognized in the terms of agreements.

Some Drawbacks of Private Foreign Investment

Only when foreign capital investment grows faster than the rate of return on old capital is there a net current addition to the flow of

foreign exchange resources available to the developing country. But if the rate of return on foreign capital exceeds the rate of growth of national income—a likely situation, for the former is not less than 10 percent and the latter rarely more than 5 percent—foreign capital must grow faster than national income. This implies, under most plausible savings-investment assumptions, that an ever-growing proportion of the capital stock will be owned by foreigners. This can be particularly serious where, as in most of Africa, there was very little locally owned capital to begin with. Even if such alienation of capital were politically acceptable, the process must end when all capital is foreign-owned and the postponement of remittances and repatriation is no longer possible.

The alternative is to remit profits abroad (rather than retain them for investment) and to buy out the foreigners gradually. This policy carries a high cost in foreign exchange to developing countries; remittances are likely to grow faster than exports (because the latter are unlikely to grow much faster than national income) and thus to absorb an increasing fraction of foreign exchange earnings. Private investment is unlikely, therefore, to be able to make a sustained contribution to the inflow of foreign exchange resources; and it presents the host country with a dilemma of capital alienation vs. foreign exchange burdens. Attempts to evade this dilemma by foreign exchange restrictions, or by expropriation, will add to investors' risks and thus to the rate of return they will require to invest, increasing the basis for resentment in a kind of vicious spiral. However, mutual gains are possible from measures which reduce both risk and the rates of profit (see below).

Foreign companies are sometimes accused of sacrificing the national development of the country to their desire for profits. It would be both unreasonable and undesirable to expect foreign companies to act altruistically in promoting local development. Within the constraints set by competition, legislation, morality and public opinion, there is a presumption that they are best employed in seeking profits, as long as they take a long-term view, not giving excessive weight to quick profits at the expense of future profits.

More serious is the charge that the local company sacrifices its own profits to the interests of the parent company or sister companies in an advanced industrial country and that this, rather than any lack of nationalism, charity or altruism, damages local development. The parent company may charge high prices for its products when sold to its subsidiary abroad, for example. Subsidiary profits may be minimized rather than maximized, by underpricing output and overpricing inputs, if by this device tax liabilities can be shifted from a high-tax country to a low-tax country. Another cause of trouble may be the high wages and fringe benefits which the foreign

company can offer to local workers; while this policy ensures that some of the profits of foreign enterprise are retained by citizens of the host country, it can play havoc with the wage structure in the rest of the affected area and aggravate the problem of employment creation.

These considerations, quite apart from political fears of domination or foreign influence, suggest that it may no longer be true, if it ever was true, that all forms of foreign investment contribute to development, and they point to the conclusion that developing countries should guard against excessive burdens of remittance.

Advantages of Private Overseas Investment

Private overseas investment can bestow substantial and unique benefits on the host country, particularly in countries where domestic entrepreneurship is embryonic and there is no other way of developing large-scale manufacturing industry. Although net additions to the volume of foreign exchange may not be substantial, the efficiency of resources transferred is high. In addition to providing capital and tax revenue on profits, overseas firms train workers in skills and managers in technology, administration, marketing and other techniques; they establish contacts with overseas banks, markets and other institutions; they introduce new processes and new attitudes and thus lay the foundations for further industrial growth in the economy.

The organizational structure of the international corporation, with subsidiaries and branches in many countries, which can, as we have seen, militate against the interests of development in a particular country, is for the same reason capable of responding more effectively to technological, political and economic changes in switching to new products, closing down inefficient lines, cutting costs by shifting to new sources of supply, etc. The pressure for greater local participation in ownership and control may impede or prevent these operations in much the same way in which nationalism and autarky prevent the most efficient international specialization. It is to the solution of this dilemma between, on the one hand, international direction in the service of efficiency and, on the other, local participation and commitment, that solutions must be directed.

A Model for Joint Ventures to Overcome Obstacles

Even in sectors and in industries in which foreign equity investment is the best form of promoting development, political considerations suggest that partnerships and joint ventures, in which local capital and know-how participate, are often preferable. A private firm could establish a joint enterprise with a local government or

a government agency, such as a local development corporation. The foreign firm should put up not more than 49 percent of the capital, but enough to benefit if the enterprise succeeds, and of course suffer if it fails. It should have a substantial minority interest, while the local government or agency has the dominant interest.

Such a holding would often be sufficient to secure a decisive role in management. But it might be possible to arrange in special circumstances that, in the initial phase, the foreign investor should hold a higher percentage of the equity, as long as the arrangement for eventual transfer to local ownership is clearly stated. The foreign firm might also provide some of the money on a fixed interest basis or in the form of preference shares.

The equity interest of the foreign firm would be bought out by the local government at the end of a prearranged period. This period could be ten years, with provision each year after say seven years to extend for a further five years up to say 15 years or longer in the case of e.g., plantation enterprises. Other forms of rolling extensions could be devised, such as periodic reviews with stated periods of extension. Alternatively, the period might be longer, but there could be options at fixed points when either the local government can buy out or the firm can sell out. An evaluation procedure to determine the price would have to be agreed.

Managerial and technical staff would initially be provided almost exclusively by the foreign firm, perhaps under a management contract, but with the obligation to train local replacements within the specified period before buy-out. The rate of replacement need not be specified contractually; the local government would be able to use its representation on the board to ensure that it went forward at a satisfactory pace.

Housing and other community services should be provided by the local government or appropriate local statutory body set up for the purpose. In view of the relatively short period of ownership participation, the foreign firm's capital should be concentrated on directly productive activities.

Official aid may provide the finance for participation of the local government. It might be possible to provide a long-term loan on soft terms to enable a host government to participate in a venture. No subsidy to a particular private firm would be involved, for the government's terms of on-lending could be commercial; only the secondary foreign exchange burden would be lightened. Governments can also support such joint ventures with buying-out options either by investment guarantees or by including a clause in the contract of the loan that in case of expropriation without proper

compensation the whole outstanding loan would fall due for repayment immediately. The force of such a clause would lie in the fear of loss of credit standing if default occurred.

Arrangements of the kind sketched out above would attract foreign capital and know-how to the activities where they are most useful, but would release them, when the host government buys out the firm, for new ventures elsewhere. Thus good use would be made of the finance and experience of foreign companies by keeping them in a revolving fund. Teams could be kept working together and political friction and transfer burdens would be minimized.

There are other possible arrangements which may serve the same purposes while imposing a smaller burden on the host country. It would, for instance, be possible to offer a management contract to a foreign investor (who might also be permitted to hold a substantial minority of shares). The foreign investor would construct and manage the plant and would receive a management fee in the form of a percentage of profits, and perhaps also of foreign exchange savings realized. At the same time the managing firm is expected to offer a credit at a fixed rate of interest to the local firm to cover either the foreign exchange costs or a certain proportion of the total investment costs of the project. The duration of the loan would be the same as the duration of the management contract.

The climate for international investment and for new forms of joint ventures would be greatly improved if a set of rules for the remittance of profits, capital and capital gains could be agreed upon and obeyed. It is important that profits earned by foreign capital should be allowed to be remitted home. Restrictions, except those imposed temporarily in emergencies, would only discourage the future flow of investment, and are as much against the interests of the investor as they are against those of the host country. But if the foreign firm borrows local capital, which it can often do very cheaply in view of its good credit standing, profits earned on this local capital need not enjoy the same freedom. The same rules should apply to these profits as those which apply to local firms.

While it may be sensible to aim at a certain proportion of equity to fixed interest investment for foreign capital in an underdeveloped economy as a whole, the proportions of specific sectors and firms may, of course, vary widely from the countrywide average. In principle, some sectors, like transport and power, could be wholly financed on a fixed interest basis to the extent that such financing is available—more readily for some countries than others. Other sectors, where entrepreneurial initiative is important, may be financed wholly by equity, while others again may show a variety of gearing ratios of equity to bond capital. Again, a variety of arrangements

can be made for the transfer and adaptation of know-how. Individuals can be hired, management contracts can be concluded, and participation in profits can be arranged. It is the purpose of such arrangements to minimize both the cost to the host country of the transfer of capital and know-how, and the political frictions, while safeguarding the interests of those who are willing to conduct this transfer.

If our main concern is the social and economic development of less-developed countries, the contribution of private foreign investment must be assessed in the light of a variety of methods of mobilizing resources, skills and know-how. Our task is to explore the most effective and the cheapest way of attracting foreign resources, skills and knowledge and the best way of combining them, and to examine new institutions, arrangements and forms of contract.

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